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SEPT. 27, 1954

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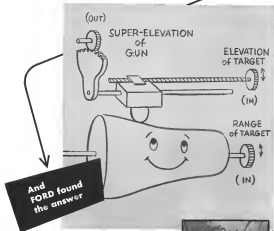
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In making computers, such information as mathematical functions can be stored in a precision-cut cam, then allowing an follower to be designed to accurately reply to the input position of the cam. Ford Instrument Company designs and makes cam of all sizes and shapes to achieve these results. To manufacture such cam with the precision demanded, the engineers of Ford Instrument have devised irreplaceable automatic machines which, by following a carefully plotted ink line on a roll of paper, cut the exact shape into the metal. Then, careful point-by-point checks, sometimes as many as 5000 measurements, assure direct accuracy.

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NEWS DIGEST



Turboprop Super Connie Goes Aloft

Tagged by Lockheed A-1H turboprop as "the world's fastest propeller-driven transport," here is the new Navy R7V-2 Super Connie as the air at the start of its flight test program. In last F&WA T74 turboprop has Shrikeless Standard Turbo-Hydrodynamic prop

and delivers a total of 12,100 hp—giving the R7V-2 a cruise speed of about 640 mph—approximately 100 mph faster than current piston engine versions. This is the first of four turboprop Super Connies. Two each will be made for USAF and Navy.

Domestic

Aircraft atomic reactors will have a maximum diameter of five feet and will develop less at a rate of 144,000 hp. Its produce 21,000 hp or more for high speed propulsion, estimates Kenneth Kennedy, manager of American Locomotive Co.'s atomic energy department.

Thrust reverser for turboprop engines, designed and built by Air Research and Development Command's Wright Air Development Center at Dayton, is an engine flight test on a jet-powered Republic P-44C. The device uses a series of cascades and two movable flaps to divert thrust forward.

New landing device that wheels are used first against a passenger terminal pier or cargo dock will be tested soon on a pilot multi-engine at New York's Idlewild International Airport. Tests will run into the Whiting Landing, which will make the aircraft deliver to its landing slot.

Paid out at A-1H Engineering Development Center at Tusculum, Tenn., will be \$200 million, estimates Reg. Co. Social Harris, Jr., A-1H's controller. Cost for \$159.9 million.

Lois Kennedy, assistant administrative assistant to the Nebraska senator and former Washington correspondent for the Omaha World-Herald, has become executive assistant to Fred A. Sutton, Assistant Secretary of Defense for Legislative and Public Affairs.

United Air Lines DC-7 flew from San Francisco to New York in 5 hr 34

International

John P. Deane, former traffic manager of the Texas Co., has been appointed coordinator of defense transportation for the Office of Defense Mobilization, responsible for reviewing and developing plans for transportation mobilization in an emergency.

Last F&WA R-160 to be produced by Ford Motor Co.'s Aircraft Engine Division has rolled off the Chevrolet assembly line. Ford's total for R-160s, 1,879.

Seaboard & Western Airlines Super Constellation added a 27,618 lb. cargo from Blackwing, Germany, to New York Sept. 17, claimed as a new record for westernmost trans-Atlantic commercial flights.

Helicopter passenger service will be started on Cleveland Oct. 15 by Cleveland Air Taxi, Inc., based recently by Kenneth C. Bohrer. The new register has and charter company now own two Bell 47Cs, plus in buy additional aircraft of business goods.

Arthur Gulliver, grounded since Mar. 16 for violating military restrictions at Tullahoma, TN, 31 Airport, has been back his pilot's license. The radio and television star passed a flight test in his DC-3 Sept. 17.

Edward O. Smith, manufacturing executive assistant at North American Aviation's Los Angeles plant and former president of the National Association of Manufacturers, died Sept. 15.

Financial

KLM Royal Dutch Airlines has negotiated with the National City Bank of New York and Chase National Bank of a \$7-million loan negotiated in 1952 to back aircraft purchases in the U. S. The largest loan was made by the International Bank for Reconstruction and Development.

International

South African Airways has decided to buy three Douglas DC-7Bs, will put the transports on Johannesburg-London flights soon after delivery in early 1956. Total price approximately \$8 million, including spares and radio installations.

Airways expenditures by Royal Canadian Air Force totaled \$149,571,000 during the first quarter of 1954-55, a drop of \$36 million from the same period of 1953-54.

Largest troop airlift contract awarded by British Air Ministry has been given to Arrowair, Ltd., independent carrier, following competitive bids. Arrowair will fly about 7,000 soldiers annually for two and a half years between Berlin and Singapore in Handley Page Hercules. Contract value \$5.6 million.

New Japanese airline has been formed to transport Japanese immigrants to Brazil, sending its reports from Sao Paulo.

New \$5-million terminal will be started next year at Montreal's Dorval International Airport.

INDUSTRY OBSERVER

Contractors vying for license to be used in Capital Airlines' Boeiboyer-Dupont-Victor-Victor, Rolls and Capital must —30F fuel, while 11-8, oil companies supply license with —30F burning power. Lower financing point would require negotiation of fuel to British agents and special handling from primary to outfit.

As Transport Area is satisfied over modest demonstration of Civil Aviation Administration to be tough about surveillance regulations for jet transport. It gets more into air without specific Civil Aviation Board rules in force, CAA indicates it will make its own and that a highly cautious approach will be used.

Defense Department is spending as much money on guided missile research and development as it is in piloted aircraft research and development. Work is under way on at least 15 different models of guided missiles, Aircraft Industries Area, reports.

Two American Airlines is experimenting with a two-way version of Schol (distance calling system) to enable its aircraft to acknowledge groundstation calls automatically without any action by the crew. Another feature will enable the pilot to broadcast an emergency signal that identifies the troubled aircraft by merely pushing a button.

First leg of United Air Lines' new transcontinental VHF communication network between Chicago and Cleveland, which will be owned and maintained by American Telephone & Telegraph Co. and leased to UAL, is slated to go into operation soon. Next segment, which will connect Boston, New York and Washington, will be tied in shortly afterwards.

Government will increase its contracts with private firms for maintenance of aircraft to \$625 million in 1955 or about 50% of the total maintenance costs. Maintenance by private firms has grown rapidly since 1952 when only 21% was handled by commercial companies.

Boeing Radio has decided to build a C-band radio system, as well as X-band, following United Air Lines decision to buy a four-wave installation of C-band equipment. UAL expects to begin evaluation tests on RCA and Bendix C-band radio early next year.

Army recently has destroyed effective, if troublesome, way to combat dirt in helicopter engine. Hot and cold air filters will do the job at they are changed twice a day during routine operations of pilot landing areas.

Indications were strong last week that an outside agency, other than the military or a civilian contractor, will get the job of processing the large number of Republic F-84's stored outdoors for months at the company's Farmingdale, N. Y., plant to bring them up to USAF acceptance standards. Continuing delays has necessitated a 40% reduction in Republic production and large orders to slow accumulation of planes requiring modifications.

Patented Helicopter Corp., has contract to study turbine installation possibilities for the H-31 Waco. Contract for construction of prototype will depend on outcome of engineering report to Army Transportation Corps. Turboshaft Aircraft 2, used in Sikorski H-33 (Armycom Warz Sept. 15, p. 17) is only one of several turbine engines being considered. Turboshaft installation would cut the four engines to replace present single Wright R3350 1001. Meanwhile, Navy is expected to order two H-33 prototypes with Wright R3350 engine replacing the Continental B975-46. Designation would be H-33-4.

United Air Lines and IBM are investigating the use of punchboard computers to record the calculation of transcontinental flight plans. Objective is to have preparation of full a dozen flight plans in advance, then let pilot select best one for conditions existing at flight time.

WHO'S WHERE

In the Front Office

W. Paul Jones, vice chairman of the board of Servco, Inc., will become president of Killion Aircraft Co., Cambridge, Mass., Oct. 1. He will continue to hold his present position at Servco, acting as a consultant and adviser.

For A. Niles has resigned to become director of International Airlines System, will be succeeded by Henry Thomsen. Henry Thomsen has been named as assistant vice president of American Airlines and appointed chief of its Washington, D. C., office, succeeding Clarence Roberts who resigned this month.

S. Dennis Kinross has formed Reimington Co. at Mountain Lake, Md., specializing in research and development for West Coast instrument manufacturers.

Changes

Charles H. Shuff is director of Vending Service, International Co.'s new, 4000-branch department at Pittsburgh, and up to supply national machine engines and related equipment overseas.

Edward M. Lind has resigned from The American World Airways to join later national Air Transport Area as chief executive officer, with headquarters in New York.

K. M. Miller has become assistant general manager of the Research and Development Division at Lear, Inc., South Mayon.

Frank A. Ryan has been appointed general manager of United Aircraft Products, structural engineering department, Dayton, Ohio.

E. L. Dine has been promoted by United Air Lines to superintendent of engine development, and R. L. Mangold has moved up to superintendent of cargo side. L. T. Long is now director of proposed relations in UAL's engineering and maintenance staff.

New manager of A. F. Tinsford, chief, I. A. Alkhalil, electrical and instrument. E. U. Fairbanks, structures and controls. Charles Fenn, equipment and repairs. H. N. Taylor, power plant. E. F. Goodrich, test services. E. M. Harris is United's new representative at Douglas Aircraft Co.

Honors and Elections

A. B. Hagan, production manager for Fairchild Engine & Aircraft Corp.'s Kerosene Division, will be general chairman of the 1955 Society of Automotive Engineers Production Forum (Oct. April).

May & M. Bennett of Boeing has been elected local committee chairman of the International Civil Aviation Organization. New vice president, C. Gentry Lee of Spitz and Dr. Theodore Sels of Egypt.

W. M. Shepherd is president of the Shepherd Aircraft & Equipment Co. of Los Angeles, has been appointed to the California Aeronautics Commission, according to Earl Fadden who signed.

"Triple Threat"

Chance Vought Aircraft's post-war F4U Corsairs, now carrying quad-engine service with the U. S. Navy, are an outstanding example of versatility and making power in modern turbo-jet aircraft. Using a wide variety of armament, Corsairs are designed to fly and fight as interceptors, fighters or attack planes.



Chance Vought Aircraft

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Arma's self-contained integrated navigation and fire control systems will contribute materially to the accuracy and effectiveness and all-weather capabilities of our newest latest model fighter bombers.
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ARMA ADVANCED ELECTRONICS FOR CONTROL

Illustration by J. J. G. for the cover of the book "The Duck and the Fighter" by J. J. G.

Washington Roundup

Republic Visit

Visits of USAF establishments to aircraft plants with production difficulties are common, but last week Republic Aviation Corp. received top-level treatment for its problems. Off to Peconicville went a team composed of Charles E. Wilson, Secretary of Defense, Harold E. Talbot, Secretary of the Air Force, Frank D. Newberry, Assistant Secretary of Defense for Acquisition Engineering, and Maj. Gen. Clarence S. Irvine, Deputy Commander for Production of AMIC.

According to USAF, the trip was made necessary by rumors over loss of production and the recent loss of a large number of delayed workdays. There was speculation, however, that Republic is making a strong bid to get a major production order for the F-34, powered by the General Electric J73 engine. Notably absent from the VIP group visiting Republic was Roger Lewis, Assistant Secretary of the Air Force for Material, who is in Europe and will return at the end of this week. Lewis is said to be opposed to the F-34 project.

More Titanium

Another round of expression of titanium angst is partly in the offing. Government contracts already let will boost output to 25,500 tons annually by 1975. This year's production will approximate 5,000 tons.

General Services Administration is on the verge of concluding a contract with deFonse de Nevers for construction of a plant in Tennessee with capacity for 7,500 tons annually. Contract negotiations are underway with five other firms. GSA is conducting preliminary discussions with 53 other firms.

New Navy Regulation

New's Bureau of Aeronautics is reviewing its purchasing documents on special tools and ground handling equipment. The 1,018 rules have failed to budget for individual items, result in a great deal of wasteful correspondence and time.

New regulation is not completed, but may well be to make prime contractor responsible for providing special tools and equipment and have a shipping or delivery date. Navy also would be assured that its test equipment and tools will be identical to those used by manufacturers. Prime contractors would get flat 2% added to contract price to pay for material.

Shotgun Wedding

Advent nonfiction being an anti local community bureau of some kind, it is a fact that the book is a perfect form of a "Shotgun Wedding." 19-page booklet published by Air Defense Command, Colorado Springs, Colo. Designed to firehouse all ADC personnel with the command's extensive problem of living with its neighbors, the booklet offers sane, sensible, step-by-step suggestions and gives a list of reports with civilian phone in major sources of ADC susceptibility.

One letter describes how commander of a Midwest base sought local complaints, and mapped a program to offset them, using community leaders, press, radio, civic clubs and other organizations to win sympathy for his pet jobs. Public support can be bad, ADC has found, but you must win it.

Aid for Pakistan

Foreign Operations Administration now is engaged in negotiations with two U. S. airlines to provide technical assistance in training Pakistan aircrew in the operation of a domestic airline in that country.

Plus calls for the entire selected to recruit a team of 12 persons who are familiar with the various phases of airline operations and then assign them to duty with the Pakistan airline. Principal need is for maintenance experts. The contract with FGA will run at least three years, and a third of the cost will be borne by Pakistan.

Two FGA air staff contractors, L. T. McPherson, an officer engineer, and R. F. Sherrill, former airline pilot, recently returned from surveys in Pakistan, Iran and Turkey. Technical aid programs also are being planned for Iran and Turkey. To qualify for FGA assistance, the country concerned must have the potential to support a commercial airline operation. Other airlines in the general Middle East area are scheduled to be surveyed.

Mirror Landing

U. S. Navy is evaluating British development of mirror approach system landing aid for carrier decks (Observer Week May 3, p. 46). Secretary Charles S. Thomas, in speech at Los Angeles, said "we fast look it promising."

Device permits pilots to make carrier landings without landing signal officer's aid. He keeps his plane in position at that light on center is reflected in dark mirror and makes perfect landing regardless of ship's pitch or roll. Thomas claims system will reduce carrier landing accidents, cut down on maintenance and permit use of lighter planes.

Viscount Certification

Civil Aeronautics Administration expects early compliance with the 25 conditions of validation for the Viscount certified by Administrator Ford B. Lee in a July letter to the British Air Registration Board.

Civil bilateral agreement, CAA accepts ARB certification that conditions have been met. First deliveries to Capital Airlines are scheduled for early spring delivery. Condition can have immediate for transportation accessibility to specifications for competent door loads.

Management by USAF

Activation of 10 new Air Force wings and about 50 other units in the next fiscal year would, under military administration, accelerate the amount of 40,000 new aircraft, however, Air Force will be increased only by 5,000 aircraft and units in the period. The amount of new units would be 45,000 with only 5,000 more units in management," according to Gen. Thomas D. White, Vice Chief of Staff.

Congress, he told a manpower management training class at Group Washington University, has given USAP more freedom in exchanging money between civilian and military personnel so long as the policy aids in the economic effort. Newest program is "Operation Nurse Free," which will substitute civilians for military personnel along the pattern set by "Operation Nurse Free" in the army contract. While such a return is based on poor maintenance rate, which will not be 33% of the Space USAF set as goal.

—Washington staff

AVIATION WEEK

Tigers Cancel Merger, Quit Airfreight

- Slick Airways will stay in air cargo field.
- But FTL sees profit in plane-leasing business.

Burbank, Calif.—Flying Tiger Line is shoring up the airfreight business and carrying its merger with Slick Airways.

President Robert Prescott says inability of the two lines to carry out labor protective provisions imposed on the merger by Civil Aeronautics Board is responsible for the decision.

"Our company has decided to withdraw from the airfreight field and establish new operations in the leasing of equipment and possibly participate in contract flying," Prescott says.

Slick will continue operations as a freight carrier.

■ **New Slick-Older Rejected.** For more CAB chairman and Civil Aeronautics Administrator and former Commerce Undersecretary in Transport Affairs, is expected to be elected chief executive officer of Slick at a board meeting this week, called to set up new company offices.

Prescott would take over the duties of Thomas L. Grier, president, who is expected to leave Sept. 15.

Joseph F. Grier, former vice president and managing treasurer of Slick, is general manager of the airline under the new management arrangement.

■ **The New Setup.**Under the agreement, Slick will sell its two DC-6As to Flying Tiger for \$3.6 million, having them back to Slick for \$24,000 per month each for five years, with an option to renew for three years at \$1,000 each. Tigers also will lease its one DC-6A to Slick at a monthly rental of \$55,000 for one year. However Slick has an option, if exercised before Jan. 1, to lease this plane at a rate of \$30,000 per month for three years or for six years at a rate of \$25,000.

Slick also will lease seven C-46s, now owned and operated by FTL, at a rental of \$1,500 per month for two years.

Flying Tiger's activities after nine years from the purchase lease arrangement on the two Slick DC-6As would total \$3,960 million against the purchase price of \$1.6 million. On two DC-6As, the total gain would be \$420,000 for one

Proposal Bypasses Labor Problem

The new Slick Airways-Flying Tiger Line proposal, under which Slick will be the air carrier, while FTL for equipment company, appears to ignore opinion the proposal of labor unions.

An outright merger was rejected by union the 707 Civil Aeronautics Act would have the two airlines in pay for 100 million and 50 million in claims for proposed merger, Tiger and Slick agreed.

"Flying Tiger" would be the air carrier and Slick would be the equipment company, according to the proposal.

over, \$1,050,000 for three years, \$1.8 million for six years.

■ **Maintenance.**The lease will provide that the equipment be maintained by Slick and returned in "good and dry condition," less normal wear and tear.

Slick also must maintain insurance to cover the cost of market value of the aircraft. On the two planes purchased from Slick, the insurance coverage must be adequate to cover the unpaid balance.

■ **New Line Flight.**Withdrawal of Flying Tiger from the airfreight field would end the a struggle that began June 25, 1948, when Prescott and 14 other pilots who flew with him in a company at Civil Aeronautics Board's Flying Tiger to Los Angeles to study the situation after this month but opposed the petition for relief (Aviation Week Sept. 6, p. 72).

■ **Seated DC.** Martin, president of Signal Co. and, and these airlines furnished the funds put by the pilots to finance the company.

Prescott says Flying Tiger will submit the application now pending before CAB for renewal of its airfreight certificate.

Commenting on whether the Tigers might reenter the airfreight field at some future date, Prescott says: "We made our job at it and that's it."

"We believe our new field offers a tremendous opportunity for us," says FTL executive vice president and an indication we can expect to earn a profit in excess of \$1 million a year in the leasing of equipment, and accordingly we are preparing plans for the operation of new equipment beyond our pay-

Under the new proposal, FTL, with, does, the current application. This means that as of Aug. 31, the airline is not subject to the 1975 Act and to labor union requirements.

Early CAB action is expected on the new Slick-Flying Tiger proposal. The two companies claim in their petition that, unless the agreement can be put into effect by Oct. 1 or immediately thereafter, it cannot be consummated.

A spokesman for the FTL says that if company employees had agreed to take salary cuts in order to keep the airline flying in the freight business.

ent fleet of 39 DC-6As, C-54 and C-46 aircraft.

■ **Backpacker.**Freight-Flying Tiger and Slick estimate that the labor union claims of the merger agreement approved by CAB might cost as high as \$6 million and would result in bankruptcy of the merged company.

The two companies declined to be interviewed for relief from the airline industry. The two companies declined to be interviewed for relief from the airline industry.

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■ **1,200 Man Labor.**A spokesman for

from the Tigers' withdrawal from the airfreight business is expected to result in the laying off some 1,200 employees, although a number of these may be absorbed into Slick's expanded operation.

The airlines are faced with the problem of working out a reorganization of backlogging, contracts and other post-merger in which they had no pending final settlement of the merger.

In many cities, as well as in company headquarters, the two airlines already had accepted these facilities. Since Slick will continue to be the freight business, facilities will be turned over to Slick.

A spokesman for the Flying Tiger says its affairs will remain the same, including, with FTL as a partner. The executive staff of the two airlines had been combined at the time the merger took, additional effect.

Prescott, who reportedly turned down an offer to take over the presidency of Northwest Orient Airlines, is president of the Texas Auto Transport, Inc., Oklahoma City. A graduate of Texas A&M College, he joined American Airlines as a pilot in 1931, became president of American Airlines, Inc. in 1943.

He was appointed CAB Administrator in 1948. CAB chairman two years later and served as Undersecretary of Commerce for Transportation from May 1951 until 1953, when he became vice president of W. R. Grace & Co. He resigned the latter position shortly after and set up the Oklahoma City Airplane Company.

FTL will continue its freight operation until Slick is in a position to take over, expected within a few weeks. This will depend upon how quickly CAB acts on the withdrawal agreement submitted last Monday.

■ **Route Bidding.**The decision to abandon ended the two airlines' merger was approved by CAB. It said in 1955 after general transportation passenger lines were established. It also ended the breakup of the large domestic route system in the routes, which served 45 cities.

Prescott told aviation officials the current usual ways ago that he would bend up the merger and go out of the air freight business before submitting to the labor demands.

"It hardly is a question of do that or go bankrupt," he said. "The problem is to make the union understand that I am serious about this and not just one of its tricks."

It barely appeared in all newspaper last week that Prescott meant what he said.

■ **Anticipated Move.**CAB would act on the bid last Monday during the Slick-Flying Tiger labor protective pro-



DUKE REPLACEMENT Duke W. Randall

vision changes without a hearing. The action taken by the two freight airlines anticipated the Board's move.

In a petition to CAB, the two airlines said:

Due to the magnitude of the potential liability under labor protective provisions involved in the Board's order of approval and due to the fact that the Board has not seen fit to modify these provisions by Sept. 15, as requested, your petitioners cannot complete the merger and continue in the airfreight business.

The airline was accompanied by a copy of the agreement outlined by the two companies, which took Flying Tiger out of the airfreight business, but Slick's line transportation of all-cargo carrier.

■ **The Petition.**CAB's order denying the petition for labor protective changes without a hearing pointed out that the two airlines had their exposure to claims from \$1.2 million to \$6.2 million, depending upon the manner in which the security both of the two firms would be integrated.

They and the Transportation contract liability would raise the cost of the merging company, might those outstanding bank loans into default and could jeopardize arrangements for additional loans, have completed to finance the acquisition of widely needed equipment.

The two airlines agreed that under their proposed modifications in the protective conditions, they believed their exposure to claims would range from \$18,000,000 to \$300,000,000.

"It is alleged that if the proposed modifications are not made on a scheduled date within a few weeks, the merger need be abandoned," said the Board order.

■ **The Decision.**After considering the petition, CAB concluded that the relief requested should be denied.

The proposed modifications in the

protective conditions are clearly in violation of the contract conditions. Since these conditions were based upon an evaluation issued after full hearing was afforded to all interested parties, it would be strongly urged that the Board was now to undertake a complete re-evaluation of the conditions through a summary proceeding.

The proposed changes in the conditions are based upon many conclusions and statements of alleged fact which can only be tested adequately by an evidentiary hearing, which also is in violation of our principles."

CAB said the fact that companies might be affected adversely by the delay caused by a full hearing would not justify the Board in dispensing with the hearing "in the presence of the serious parties to the proceeding."

CAB said it has not been insensitive to the problems of the two airlines and has, should study at all times to lead its decisions, but cannot consider under the Board's duties and responsibilities under the Act.

Boeing 707 Starts Buffet Boundary Tests

Boeing Airplane Co. will fly its prototype 707 at St. Louis-St. Louis to its "buffer boundary." To determine the transport's maximum speed in just of its initial flight program, interrupted by damage to the new aircraft assembly Aug. 5 (Aviation Week Aug. 16, p. 577).

During this phase of the 23-man program, which began last week, the 707 should attain speed closer to the speed of sound than reached by any transport aircraft to date.

Other characteristics to be investigated by the 707:

■ **High speed.** The aircraft at the greatest speed possible. The descent rate is projected to exceed four miles a minute with an engine and landing gear extended for maximum time.

■ **High gross weight tests.** including full up with sufficient fuel to subject the structure to 50% of the design limit G load.

■ **Builder's certification.** including a check of the use of the new Pratt & Whitney Aircraft J57 turbojets to determine the lower speeds that the 707 can be controlled safely under these conditions.

■ **Stability and control.** control of gusty winds. Stability and control characteristics will be investigated throughout the G range.

During all of its trials, the other accompanying test personnel in stress will be operating.

The 707 has been fitted with a dog chute to test effectiveness of the device. Several minor modifications have been made to the Lockheed test system.

measure question of a congressional committee with a three-year second watch lagging about.

During World War II, small business got 45% of the prime contract dollars paid out by AMC. By 1953, the figure was 9.5%. In 1953 it was 4.5% and in 1951 5.8%.

The low 1953 figure for percentage of all contracts is really representative and every AMC small business specialist is quick to furnish an explanation. The reason is large firms at fiscal 1953's large order of \$14,220,595,000 went for weapon systems and major components that cannot be made by most small businesses in prime quantities.

► **Potential** Yorktown-AMC spokesmen are careful to measure success of their small business effort against the "small business potential" and not against the total dollars spent in a fiscal year.

Here is USAF's explanation of why the largest dollar volume of its procurement came of necessity from large companies:

There are about 1,500 prime contractors adding goods to AMC. Some 2,500 are small businesses, employing fewer than 500 persons. Of the 303 offices, 75 are as big and as important as the weapon system procurement picture that AMC large plant representatives and staffs in the plants at all times.

These companies take responsibility for the development, design and pro-

duction of fighters and bombers. Their contracts total approximately 52% of the procurement dollars spent by AMC. The contracts are not awarded just at the "small business potential" because no company with 500 or fewer employees could do the job.

"The only measure of a program that has validity is to allow the dollars awarded small business to the extent they could possibly get," says Kenneth Waddell, chief of the Office of Small Business at USAF Headquarters.

On this issue, Waddell reports that all contracts small business is capable of handling, it received 53% in 1952, 75% in 1951 and 76% in fiscal 1954. ► **Fertile Soil**—Seed source of business for small firms lies in the field of subcontracting to some of the 500 large businesses that hold prime contracts, and the vast fertile soil in this field is among the 35 companies producing weapon systems at major plants.

To utilize even possible small business source, each one of the large business prime contractors is required to name one of its own top-level officials as small business liaison officer. This has resulted, according to Waddell, as small business programs in most large prime contractors.

► **Operation** Procurement—Several major USAF activity in Operation Procurement: a campaign to increase the number of prime Air Force contracts with small business.

Prime responsibility for Operation Procurement is held by the small business

specialists at each of AMC's 16 major purchasing offices. In addition, the office is linked to the demands of 155 USAF bases where manufacturing items are bought from local manufacturers and vendors.

AMC uses every procurement except those that are classified or for less than \$10,000, is screened. If the second shows as more even was bought from a small business as first a small business even had to ask it to AMC as if publicity produces a bubble, small business gets a free chance to sell.

Operation Procurement has figures to prove its own effectiveness. While they reflect the changing nature of AMC's purchases and the fact that suppliers are growing more complex and more or more to the small businessman, they also show that his percentage of the potential of prime contracts has increased 25% in three years.

Dollar value of the potential declined \$51,575,000 between fiscal years 1952 and 1954. But the percentage of the prime contract small business potential awarded to small business jumped in those years from 19.8 to 29.9% in Operation Procurement.

► **Important** Contract—Third program aimed not by AMC to attract small business capacity at that offered by small business specialists in 34 defense and subcontracting offices.

"These offices," Waddell says, "see the small business potential of contract. The small business man who wants to be a prime or subcontractor for USAF requirements."

Here is what they do:

- Maintain close contact with large prime contractors and charge not only to pass along information on subcontracting opportunities.
- Maintain lively records of small businesses for large prime contractors on the hunt for new sources.
- Act as liaisons between AMC and small business whenever the opportunity arises for placement of a prime contract.
- Maintain bid sets and drawings and specifications on pending procurements in the 16 major AMC purchasing offices as well as the local buying being done by nearby USAF bases.

► **Facts of Life**—In a boom year for USAF small business orders, such as fiscal 1953, 33% of the money spent by AMC found its way to small production plants.

To keep the percentage high, Waddell says, small business must face up to two big bits of life:

- It must keep pace in line. AMC will not pay a premium just to get the item from a small business source.
- AMC is forced to keep some of the large production sources in operation because of their value to America in case of an emergency.



Inside Bell's New Four-Place 47G-1

Cabin of Bell's new 47G-1 four-place has three side doors. Passenger seats folded upward opened the way will be conversion to an ambulance helicopter. A stool for a medical attendant can be fitted next to the pilot. Note how the pilot's instrument panel

is tilted and offset to his left to give him optimum forward visibility. New 47G-1 was shown recently at Wright-Patterson AFB (Aviation Week Sept. 13, p. 17). Bell has been downgrading the cockpit as small industry bases in the United States.



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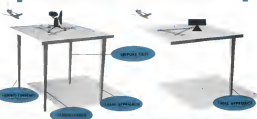
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THE NEW U.S. AIR FORCE

An Appraisal of the Nation's Airpower Program

By Sen. Lemmon S. Sutherland

My President. Recent events in the Far East underscore the necessity for steady nerves and the long view of the United States as to maintain effective its position as leader of the free world. Fundamentally to not allow to adopt such an attitude and to hold it with firmness and confidence in public understanding of when we are not whether we are going. It is no field is then more true than that of our national defense. Within that field, public understanding is no less more important than with respect to the rate and direction of build-up of the nation's airpower program.

Now that the Defense Department appropriation bill for the fiscal year 1955 has been enacted into law, I believe the time opportunity for a calm and objective appraisal of the present status and future prospects of that program.

Just about a year ago, in connection with the Senate debate on the fiscal year 1954 Defense Department Appropriation Bill, I took the floor to present my views on the Administration's air program. There had been much public discussion at that time of the difference between the Air Force budget proposed by President Truman and that proposed by President Eisenhower. Now, a year later, although members of the Administration's air program appear to have submitted major differences in recipient and cost.

Last year I said: "Let me first state just as emphatically as I can state it that I am first and foremost for a strong air force as an air force both offensively and defensively that our greatest and greatest our national security." Events of the last year have strengthened this conviction. That is why I welcome national public discussion of the nation's airpower program. That is why I have listened now carefully and attentively to the remarks of my colleagues in the Senate on this subject and to the testimony of Defense Department officials before the Senate Armed Services Committee and the Senate Appropriations Committee.

At no time in the history of this country has the problem of national policy been of more direct concern to the average citizen than it is now. All of us, both individuals and collectively, have a new vital stake in the successful solution of the color problem. There is the time for calm and objective discussion, for close thinking and for considered action. Paraphrasing as without defense should there be needed. Furthermore in not my purpose in these remarks.

AIRPOWER'S NEW LOOK

The most important element in national defense of the time is airpower. This has been recognized by both military and civilian leaders throughout our national history. President Eisenhower in his message transmitting the fiscal year 1955 budget to the Congress stated very clearly that the budget "pays tribute to the nation's investment and full exploitation of modern armaments. Our military power and those of the other nations of the free world again is in the importance of airpower."

Admiral Radford, Chairman of the Joint Chiefs of Staff and in his statement explaining the new look. "Today there is no important senior military officer in it to the capital force of airpower. Offensively, defensively, and in support of other forces it is a primary requirement. Its strength continues to grow, both through increases in combat air-

craft and through better equipment."

I do not believe there is any real disagreement in this country as to our airpower objectives. The differences between the proponents and opponents of the Administration's air program appear to lie in the manner in which it is proposed to attain these objectives.

Last year the basic difference was how much money should be appropriated for fiscal year 1954 to meet the needs of the program, based on how much money could which be placed under contract. The ultimate size of the

Vital Airpower Document

ARMY-WAR. members of our series today on the new 1955 Air Force with the complete text of the recent address by Sen. Lemmon Sutherland on Capitol Hill. It is described in Washington government and military circles as equivalent to a "white paper" presenting the Eisenhower Administration's airpower policy, now in effect. It is known that the highest Administration and military members officials collaborated with Sen. Sutherland in this official policy and program report. The address, delivered July 26, is the most important formal statement on U. S. airpower policy since Admiral Radford, chairman of the Joint Chiefs of Staff, announced the so-called "New Look" (Sen. Sutherland is chairman of the Senate Armed Services Committee. We believe it is important for our readers to be familiar with such vital official statements, in order to understand better the need-to-work developments in military action areas. —RHW

Air Force was not the case, since the 1955 program was specifically stated to be an interim plan pending a suggested of the entire military situation in the week's upcoming Joint Chiefs of Staff.

This document was completed in December of 1953 and the new airpower goals unanimously recommended by the Joint Chiefs of Staff were incorporated in the fiscal year 1955 budget. What are these new airpower goals and how will they provide for the defense of the United States and for our role in the collective defense of the free world?

MARINE, NAVY ROLES

The new airpower program provides for a steady buildup of the Air Force in 1955 from by June 30, 1957, together with necessary support units both flying and land-based. It also provides for the continued modernization of our 16 Navy carrier air groups, 15 Navy carrier amphibious assault squadrons, 15 patrol aircraft squadrons, 4 island and 4 helicopter squadrons, 1000 support aircraft, and 10 Marine air squadrons with their appropriate support elements. It further provides for the continued modernization of the reserve components of all three of these elements of our airpower.

All too often in the 2 years of national apathy, need and Marine aviation are overlooked and ignored, yet in terms of active strength our Navy and Marine aviation represent more than one-third of our total air power. Many people would be surprised to learn that as late as June 30, 1955, Navy and Marine aviation represented about the same number of fighter-type aircraft as the Air Force.

Admiral Radford in his statement before the Senate Appropriations Committee on May 15, put the matter very well when he said: "Some people do not fully comprehend the true knowledge of today's United States, national airpower, and I would like to state unequivocally that it is

to that of any other nation. Furthermore, the United States has no developed defense agencies of its own as to achieve a strategic air force and a tactical strike force which are self-sufficient in this world."

In 1953, the new Air Force program for a total of about 40,000 Air Force and Navy active aircraft, an increase of approximately 6,000 over the number on hand at that time. The new program also provides for the continued modernization of this aircraft inventory to that by the end of fiscal year 1957 the entire force will have reached a very high level of modernization.

The new Air Force program also places increased emphasis on continental defense. In this connection there appears to be some misunderstanding as to the nature of the 117-wing Air Force program. I have heard it said that in terms of combat wings the program is just the same as the earlier 145-wing program. This is not the case. The number of combat wings is the same, but the composition of the force has been significantly altered. The number of air defense wings has been substantially increased in the new program, and the capabilities of our bomber and tactical wings have increased by availability of new weapons.

STEADY BUILDUP

The increased emphasis on air defense does not end with the increase in the number of air defense wings. Major improvements are being made and will continue to be made, in our radar defense, on the ground, in the air, and at sea. Not only will the size and scope of our radar defense and early warning system be expanded but the quality and effectiveness of the equipment will be vastly improved as new devices are introduced into this system. All these of the Services have an important part in this vital mission.

As I have stated the new Air Force program provides for a steady increase in the size and capability of the Air Force. The rate of buildup is slower than that claimed but not slower for the original 145-wing program, but it is a rate which is reasonably free of fluctuations, one that can be accomplished without reducing the combat readiness of the force, one, in the process, that can be accomplished efficiently and economically, and one that will enable us to maintain a strong aircraft modernization schedule.

The rate has been agreed to in whether the proposed rate of buildup is fast enough in the light of the threats that we are national security. This is a matter of military judgment. The committee due for the 117-wing Air Force was unanimously recommended by the Joint Chiefs of Staff and was approved by President Eisenhower. There are some persons with extensive experience in military affairs who maintain that the build-up rate that would be achieved by the Air Force is not fast enough, and that it is not possible to maintain a steady rate of buildup in the face of the threat to our national security. I am sure that the Air Force will be able to maintain a steady rate of buildup in the face of the threat to our national security.

LONG-PLANNED CONCEPT

This difference is viewpoint is completely the difference between the long-planned concept and the former D-Day or "war of attrition" concept. The Joint Chiefs of Staff, the National Security Council and the President have decided to give the Air Force the force it needs. Since it is impossible to forecast precisely the size and the amount of military damage, it was decided to provide a steady military posture which could be maintained reliably over an extended period of cold war. As I have said, that this is a matter of military judgment and I have heard the arguments pro and con, I take my position with the Joint Chiefs of Staff, the National Security Council and the President.

Aside from the question of military judgment, the long-planned concept appears to me to have great advantages over the year-to-year concept represented by the original 145-

wing Air Force program. It is not generally realized how big and how rapid a build-up the original 145 wing program called for.

The program presented to the Congress in January and February 1952 called for the activation, training, housing and equipping of 56 combat wings by June 30, 1953, 120 combat wings by June 30, 1954, and the full 125 combat wings by June 30, 1955. These combat wings comprise the fighters, light and medium reconnaissance elements of the Air Force. The 145 wing program, of course, also included 37 troop carrier wings. All 125 combat wings were to be fully manned, equipped and properly based by June 30, 1955, and fully modernized by Dec. 31, 1955. During the same period of time the Air Force was to have reduced its reserve force from practically nothing to a total of 37 wings plus a variety of support units.

In the very first year of the program, the Air Force build-up fell short by six combat wings. Instead of 96 combat wings, the Air Force had only 90, and of these, eight were reported as having a very low degree of combat capability because of extreme shortages of aircraft, other equipment, personnel and/or facilities.

When the Air Force came before the Congress last year, the 145 wing program reflected in the Truman budget had already been slowed down. Instead of 125 combat wings by June 30, 1954, the revised program called for 116. The Air Force had already recognized by the time that it could not meet the original building schedule and had cut the June 30, 1954, goal by four combat wings.

But this left a total of 28 new combat wings to be activated, manned, equipped and based in fiscal year 1954 plus some 20-odd combat wings of the existing 90 to be converted to new equipment and the training and equipping of the eight combat wings carried over from fiscal year 1953. It is completed. In addition, the rebuilding of the Air Force Reserve and the Air National Guard was to be continued at an accelerated rate.

It is difficult for the layman to grasp the magnitude of the task represented by these few simple numbers and facts in an effort to provide some basis for comparison, it may be useful to review briefly the actual experience of the Air Force during the fiscal years 1951 through 1953.

KOREAN INFLUENCE

The Air Force had in being on June 30, 1950: 42 operational combat wings in the regular Air Force and 32 combat wings in the Air National Guard and the Air Reserve. One year later the regular Air Force had 72 combat wings in being and the Air National Guard and Air Reserve only 5. In effect, the 50-wing build-up during fiscal year 1951 was almost completely at the expense of the reserve component.

The resources of the reserve units both men and material were absorbed by the regular Air Force and reflected in the 50-wing increase. But this was a serious loss. The next year, fiscal year 1952, the Air Force gained only 5 combat wings, and in fiscal year 1953, the third year of the Korean build-up, it gained only 10 more, making a total of 90 combat wings on June 30, 1953. Of these 90 at I have and before, 5 had little or no combat capability.

It may be argued that the Air Force during the entire three-year period was engaged in active combat operations in Korea. This no doubt had some bearing on the slow rate of build-up during that period but only to a limited degree. Combat losses of modern aircraft during the entire Korean war were quite minimal. The fact remains that a large part of the 125 combat wing build-up still remained to be accomplished at the beginning of fiscal year 1954.

One very important aspect often overlooked in the discussion of the original 145-wing Air Force program is the effect of the program rapid build-up on the combat effectiveness of the force as a whole. The activities of training, equipping and training of a new wing or the conversion of

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an existing wing to entirely new equipment requires a tremendous effort and a considerable period of time before the newly activated or newly converted wing is brought to a level of full combat effectiveness.

TRAINING PROBLEMS

It may not be generally realized that a new wing cannot be activated outside with new people. A cadre of trained personnel must be detached from an existing wing to provide the nucleus around which the new wing can be organized, equipped and trained. The withdrawal of these trained cadres from existing wings inevitably reflects the combat effectiveness of those wings. The wing loses while the trained cadre is detached then regains a period of time to rebuild before it can regain full combat effectiveness.

We have been told by the Air Force that eight to 11 months are required, on the average, from the time a new wing is activated to the time when it achieves full combat readiness. It can easily be seen that the activation of 30 new wings in a single year, in itself, would have had a major effect on the combat effectiveness of the existing wings.

It is perhaps even less well known that the conversion of an existing wing such as a B-58 or a B-59 wing to radically new equipment such as the B-47 would completely eliminate the combat effectiveness of that wing for a period of three to six months and that it would take six new months or longer for that wing to regain full combat readiness.

When the conversion is started, the wing has to be grounded. The mechanics are sent to the technical training center to be converted to the new equipment. The engine mechanics obviously must undergo extensive retraining, but so do the electronics personnel. The electronics section of the B-47 is much more extensive and sophisticated than that of the B-59 and B-56. It is relieving this last group to provide some indication of the magnitude of the task involved.

At the same time, the air crews must also be activated to fly the new airplane. The B-47 is radically different from the B-59 or B-59 and the familiarization training required is quite extensive. Thus, the B-47 pilot is a much smaller crew than the corresponding crew of a medium bomber. This means that each of the three men in a B-47 crew must master a wide range of knowledge and skill. All of this takes time and during that time the wing being converted to new equipment has little or no combat effectiveness.

At the activated personnel are brought together again with their new equipment, more training is commenced. Several months of such training are required before the wing is again an operational and combat-effective unit.

It is clearly inevitable that the Air Force could have activated, manned, equipped and trained 25 new combat wings and converted to entirely new equipment some 20 old existing combat wings all in a single year. If the attempt had been made, it would have seriously reduced the overall combat effectiveness of the Air Force.

The new 137-wing Air Force program minimizes this threat to the current readiness of the force. In years of combat wings the new program provides for a steady buildup of some 5 to 10 combat wings each year, fiscal years 1954 through 1957.

This is a rate of buildup which experienced industrialists are reasonably attainable without causing an imbalance in the Air Force program and without diluting the combat effectiveness of the existing force. This realistic rate of buildup will permit the Air Force to properly man, train, equip and bring the new wings to the air and to maintain the combat effectiveness commensurate with the expense in number of wings.

QUALITY EMPHASIZED

Another distinct advantage of the new Air Force program

over the old is that it places the emphasis on quality rather than mere quantity. The program showed out of building up reflects the concern for numbers. It reflects the proven as the Air Force to accept equipment with less than the desired performance characteristics. It provides time for the industry development, testing, production and adaptation into the lines of the latest and more advanced types of equipment. It should do much to eliminate the undue haste of modification of equipment after it is delivered to the Air Force and the extra cost and delay resulting therefrom.

Those of us in the chamber who have been extremely concerned with weapons problems and programs during the last three or four years will necessarily recognize the value of the benefits promised by the new approach. For years we have been faced with despondent claims, with deep pessimistic gloom and with serious doubts as to our ability to meet the needs of the country for the development of the new weapons.

We have been told by the Air Force that eight to 11 months are required, on the average, from the time a new wing is activated to the time when it achieves full combat readiness. It can easily be seen that the activation of 30 new wings in a single year, in itself, would have had a major effect on the combat effectiveness of the existing wings.

I do not say this as a criticism of the past. I am sure that I am well aware that the situation today is quite different from what it was then, or four years ago. But the solution today is very much stronger than it was in the situation of 1945. But it is hard to see in the most optimistic manner possible that the time now ripe for a drastic change in our approach to the problem of building up an inventory.

Now that we have shown of national agencies which the Chairman of the Joint Chiefs of Staff states unequivocally is superior to that of any other nation, it is in my opinion to make the completion of new planned buildup in a crash basis, regardless of the effect on the quality of our program.

ECONOMIC EFFICIENCY

This leads me to the third advantage of the new Air Force program as compared with the old. The rate of buildup projected in the 137-wing program should be attainable without extraordinary action on the government's economic and financial side as to longer be needed for speed. The Air Force can now conduct its efforts in an orderly business-like manner with due consideration for costs. Program elements can be kept in balance—development, research, development, personnel procurement, personnel training, base construction, etc. Shipping and individual elements of the program can be obtained without significant delay to the program as a whole.

The Air Force, in the last year, has been marginally getting its house in order, cleaning its overheads and purging of those items which are surplus or excess to its reasonable needs, as are the Army and Navy. This task is huge indeed.

In the procurement area, the Air Force can now do its contracting on a businesslike basis. Negotiations can be completed without undue delay and without any delay. This should enable the Air Force to obtain better deals for the Government. It will also mean that all the terms of the contract are worked out before the Government is obligated, and specifications are available before contracts are signed and production is started.

PROCUREMENT REVISIONS

There is one more important advantage in the new program which I would like to talk about before I leave the subject. The rate of buildup projected in the 137-wing program has permitted an extensive revision of the overall procurement program. It has permitted the Air Force to give attention to manufacturing capabilities to produce new jet aircraft and in the very difficult problem of restoring a vigorous aircraft manufacturing industry.

(Continued on p. 35)

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lided the original 147 song Air Force program. Here, possibly, an early production peak followed by a sudden and drastic reduction in aircraft production, to the point of practically closing down the industry, could not have been avoided. Under the new program, the peak has been leveled out. Both the industry and the Air Force now have programs projected well into the future which provide for an orderly transition from building ships at production to reducing rate of production. It will prevent an industrial base capable of meeting the contingencies of the future.

The maintenance of a steady level of aircraft production is important under

war conditions, but it is crucial when our civilian plants are focused on the long pull. In these circumstances we cannot tolerate sharp expansion and contractions in the aircraft manufacturing industry since we now have to call on it for all-out production at one time during a long period at various points. I need not stress the fact that by so stabilizing the aircraft manufacturing industry, we are laying the foundation for efficient production and decreasing costs to the Government.

To sum up, OPA now requires program calls for building steadily every step of the way for a program of aircraft and ships in the number of ships but in

the what-often-amounts-of-the-force-in-well-frequently rather than some quantity and for an orderly program which will facilitate the economical and efficient management of the program. It also provides a much faster foundation on which to expand or contract our airplane program should that be ever necessary, as the warplane is now distant future.

NAVY AND MARINES

In the case of the Navy, although there has been no increase in the number of carrier air groups and amphibious marine squadrons, and helicopter squadrons during the last two fiscal years, there has been an increase of 139 in the number of planes on hand with these units. Also, in the three Marine Air Wings during the same period, the number of combat planes on hand has increased 40 percent.

Fueled with the modernization and re-equipping of combat units with higher performance type aircraft, the Navy and the Marine Corps have made great progress in increasing the effectiveness of other units, such as the integration of helicopters into amphibious warfare forces, and bases for amphibious assault operations from Navy aircraft carriers.

Several large Navy aircraft carriers have been modernized for more effective amphibious warfare, but, even current and close support tasks. These aircraft carriers provide, by virtue of their speed and size, a more effective amphibious warfare than the light-armor class carriers that they replace. Incorporating the new (converted) deck, improved higher capacity catapulting and stronger plane recovery equipment, they have a capability of operating the newer types of amphibious warfare aircraft. More recently, a new carrier conversion program was initiated to incorporate steam catapult and increased elevator capacity.

By using the single deck for aircraft carriers, the capacity of the deck for landing aircraft on and off the living deck is appreciably doubled. The single deck development will also make possible savings of 3 million dollars in the construction cost for each new carrier. These improvements are being incorporated in the new Forrestal class carriers now under construction, and are planned for all new carriers to be constructed.

ACCOMPLISHMENTS

I would like to turn now to the accomplishments of our airplane program during the last year. Significant progress has been made in converting our air force to jet aircraft. Inventions of jet airplanes have been increased about 50%. During the last 15 months,

XB-62 **SECRET**

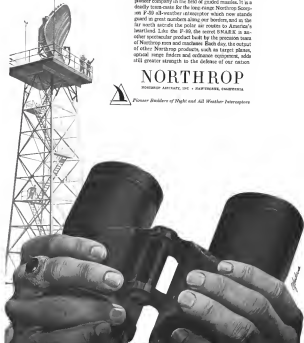
SHARK XB-62, new problem bomber of the U.S. Air Force, is the culmination of more than seven years of development by Northrop Aircraft, Inc., pioneer company in the field of guided missiles. It is a deadly team-mate for the long-range Northrop Scorpion F-80 all-weather interceptor which now stands guard in great numbers along our borders, and as the far south sends the polar air routes to America's heartland. Like the P-60, the secret **SHARK** is an offset spectacular product built by the precision team of Northrop men and machines. Each day, the output of other Northrop products, such as target planes, optical range finders and airborne computers, adds still greater strength to the defense of our nation.

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the new increase in total Defense Department airplane acquisitions has been more than double that achieved during the previous ten-and-a-half year period. From the beginning of Korean hostilities to the end of 1952, Modernization of our air forces has proceeded at a rapid pace.

Obsolete World War II types of Navy and Marine aircraft have been replaced by the newest type patrol, attack, search and jet fighter aircraft. Most of the World War II Air Force airplanes, except for a few wings of B-29s, have been discarded from the front-line combat inventory of the regular Air Force. In fact, the first operational jet

fighter, the F-80, has already been discarded from our front-line combat inventory. The Air Defense Command's present fighter/interceptor force has been substantially modernized.

Last year I said, "By June 1954, the new budget will produce 114 Air Force wings. Actually, the Air Force had 114 wings activated by June 30, 1954. It has in excess of 12 wings over the 103 on hand in March 1955. All 12 of these are combat wings—bomber, fighter and reconnaissance. In the end of fiscal year 1954, the Air Force had 79½ combat wings in the highest category of readiness then in being in March 1955.

The number of wings in the lowest category, of readiness was reduced during the same period to one-third the number in that category in March 1953. Security considerations preclude a more specific statement as to our present level of readiness, but I believe the figures I have cited convey the fact that significant progress has been made in bringing the combat effectiveness of the Air Force as well as the number of wings.

ANG, RESERVES

The improvement in the strength of our regular Air Force has been paralleled by a notable improvement in the strength of the Air National Guard and Air Force Reserve. The number of planes in the hands of the civilian components of the Air Force has more than doubled since March 1953, and 44 fighter, light bomber, reconnaissance and transport wings have been organized. Of the Air National Guard's 37 tactical squadrons, 32 were partially jet equipped as May 1, 1954.

The quality of the planes and equipment being made available to the reserve forces, Air Force, Navy and Marines, is improving in consonance with the increasing availability of modern equipment in the regular forces. The reserve programs of the several military departments, which will be featured in this issue, will have recently appropriated for fiscal year 1955, call for increased training of reserve forces and for their closer integration into the overall very plan. The Department of Defense is giving substantially increased attention to these programs in fiscal year 1955 and will continue to do so, with the aim of assuring that this most necessary element of our embroilment force is properly equipped, adequately trained, and efficiently utilized.

The Armed Services Committee last year conducted an on-the-spot survey of the training activities being carried out under the reserve program and on Jan. 28, 1954, published a report on it. Just as soon as the Department of Defense has completed its recommendations for the program, our Committee will conduct hearings to determine what legislation is necessary or desirable.

In the meantime, extensive work is being done to hasten the development of peacetime training and other aspects of the program. The facts presented to the Senate by the junior Senator from Missouri the other day, contribute the urgency of this program. They do not demonstrate that just in being done that this can be accomplished or satisfactorily aimed at. I think, of course, make possible the smooth that have been obligated or programmed for research and development in the field. But I can and do emphatically assert

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[These weather items prepared in consultation with the United States Weather Bureau]

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Freezing Precipitation—Lower deck of stratified clouds may bring freezing drizzle. This usually can be expected at 2,500 feet perhaps with clear skies above. Freezing rain, however, and even winter ice and cloud layers with.

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Selected for use in our most modern fighters, the F-102—Edison's new fire detection system proves outstanding under the most rigorous performance conditions. For the research facilities of the world-famous Edison Laboratory—and unacquired experience now provide an airtight fire detection system that meets all of the requirements for today's flying.



- Simple, fast-point operation — a single wire connected at thermostat points with a grounded outer sheath — temperature sensitive at all points
- Exclusive power protection — protects from primary battery supply — eliminates electrical fires
- Automatic negative warning — the central console lights the pilot in only 2 seconds full test of warning cables, at 1 point
- Low impact cost design — is absolutely completely false alarm due to moisture or exposure effects
- Response within seconds — signals "Fire Out" automatically — and repeats repeatedly to fire experts
- Fireproof wire design — in fireproof completely false alarm due to moisture or exposure effects
- Fireproof wire design — in fireproof completely false alarm due to moisture or exposure effects
- Used in temperature alarm points — from the most dangerous design with a single cable loop — provides maximum sensitivity for each wire point
- Wireless and shock resistant — because there are no moving parts — no exposure to shock in the early flight cable, when you enter or the computer does go this revolutionary development

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the aircraft has been thoroughly tested and has fully demonstrated its ability to meet service requirements, will include a shipment of the F-102 type of equipment after full production is started.

Another major accomplishment in developing our national defense during the last year has been the complete superannuation of the Air Force build up. Secretary of Defense Wilson, in his statement before the Senate Appropriation Committee on the fiscal year 1955 budget, stressed in that there are three distinct methods of achieving economy in military affairs.

First, economy in planning, or, in some call it, economy in force.

Second, economy in programming, and

Third, economy in operation.

Programming is the area in which forces, weapon systems and strategy are translated into requirements for manpower, material, fuel, and maintenance resources, etc., which, in turn, determine the amount of money to be spent. Economy in programming is achieved first by providing only the essential activities and programs and by eliminating the wasteful and merely essential, and second, by maintaining flexibility and balance among all activities and programs—men, material, base, service and communications of units, training units, operating units, deployment, etc.

OUT OF BALANCE

The Air Force program, by the end of 1953, was well out of balance. The details of this imbalance have already been mentioned numerous times, and I shall not dwell on them now. What I wish to repeat is that major studies have been made within the last year to bring the Air Force program back into balance.

The more realistic type of building provided to the new 17-wing force will be greatly benefited by the elimination of program elements and has greatly enhanced the possibility of keeping the program in balance in the future.

The Air Force program, material, and base construction, which have been replaced, first by bringing them into alignment with the 17-wing building schedule, and second by bringing them into balance with one another. The results of that major program adjustment have apparently created a balanced program in some quarters. It is obvious that when a program is already seriously out of balance, the only way to re-balance it is to adjust those elements which are out of balance, and to adjust up those which are lagging. This is exactly what the Air Force has been doing during the last year.

The program element which has lagged the most has been base construction.

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These Royal Gulls have been in service with the United States Navy since they were first built by the world famous Royal Gull Aircraft Corporation, Inc., in 1934.

PERFORMANCE DATA AND SPECIFICATIONS

CHARACTERISTICS AND WEIGHTS	POWER PLANT
Overall length..... 23'6"	Two Lycoming O-445-C2B
Wingspan..... 40'0"	340 hp each
Weight..... 11'0"	Propellers (fixed three-blade, variable pitch, fixed not speed, full feathering)
Wing area..... 264 sq ft	Fuel capacity..... 110 gal.
Empty weight..... 3700 lbs.	All metal, monocoque construction
Max. useful load..... 1740 lbs.	Altitude (max. operating) 20,000 ft (17,000 ft) service ceiling
Gross weight..... 5440 lbs.	Price, complete, approximately

PERFORMANCE

Maximum speed (at sea level)..... approx. 180 mph	Max. climb..... approx. 700 ft/min
Cruise speed (at 10,000 ft)..... approx. 140 mph	Cruise speed (at 10,000 ft)..... approx. 140 mph
Climb to 10,000 ft..... approx. 2 min.	Service ceiling (with payload)..... approx. 20,000 ft
Service ceiling (with payload)..... approx. 20,000 ft	Takeoff run, land..... approx. 300 ft
Takeoff run, land..... approx. 300 ft	Landing run, land..... approx. 312 ft
Landing run, land..... approx. 312 ft	Time for takeoff from water (at wind)..... 15 sec.

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If you're that man, this amphibian puts new, more useful wings on your command... provides convenience unobtainable in any other type of aircraft. Go when you want... at speeds approaching three miles per minute. Fly where you will... in 5-place executive comfort up to a thousand miles or more. And land where you please... any airport, lake or river can be your landing field.

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America's first jet transport is in the air

This is America's first jet transport, pictured on its historic occasion of its first flight. When it lifted off the runway at Boeing's Renton, Wash., airport, there is marked a milestone in the field of aerial transportation in this country.

The airplane you see is a prototype model, built to carry forward flight test work, and to demonstrate the advantages of its advanced design. Faster than any previous transport by more than 100 m.p.h., it can span the continent in five hours, the Atlantic in seven.

In a market version the new Boeing will be able to accompany jet bombers and fighters on their missions, and defend them in flight at their most efficient speeds and altitudes. And as a military transport it will provide a vital personnel and cargo supply line geared to the speed requirements of all jet military operations.

The new jet—to be known as the Stratolifter—is in military configuration now—and as the Stratolifter in its own natural civilian—as an advanced, jet-powered transport—will be in the hands of the airlines in the near future.

All details of the design, systems and installations. The experience gained in building and testing the prototype has an additional advantage. It makes possible delivery of a larger production model as a much earlier date than would be possible without such specific prototype experience.

America's first jet transport built by Boeing's unparalleled experience in the field of large, military aircraft. It is, in fact, too, by Boeing's 38-year history of designing and building jet aircraft, of its proven ability to meet the most exacting standards of reliability, performance and dependability.

BOEING

from a major effort has been made and is underway to bring the program ahead of the new 137-wing build-up schedule. There is every intention that this can be satisfactorily accomplished. The adjustment in the future build-up will greatly facilitate the proper timing of such as they are needed and made ready to function.

RESHUFFLE

A very extensive reshuffling of personnel has been required to bring the national program into balance with the other major program elements and the new 137-wing build-up. This has involved the modification or cancellation of many tactical contracts and the cancellation or adjustment of numerous contracts for aircraft components and other major procurements.

During the last 12 months of fiscal year 1954 the Air Force deobligated \$1,000 million in the Aircraft and Related Procurement Appropriation alone, and for this year as a whole deobligations may total \$1 billion. These deobligations, in general, reflect a systematic reduction in the light of more stringent standards of need or more recent operating experience. For example, increased target life expectancy and the creation of combat operations in Korea enabled the Air Force to cancel about 550 million worth of engines and engine parts.

The cancellation of the F35 contract produced a deobligation of about \$120 million. The reduction in the heavy gun program resulted in the deobligation of about \$52 million, and so forth.

This reshuffling of procurement was also required by the inauguration of the new Air Force Federal Procurement Policy which is designed to ease the placing of future contracts as to whether they are considered as a direct or indirect procurement project, while at the same time building down the further acceleration of unified action in the branch of manufacturing.

FLEXIBILITY

This is one of several actions taken by the Air Force to place its buying operations on a more businesslike basis.

By fitting new contracts at the latest time possible, without meeting any in the production line, the Air Force retains maximum flexibility in its procurement program. More time is available to make changes in the program as the needs for it are met.

Furthermore, this policy provides a much needed incentive for the contractor to meet their production schedule. No time constraints will be placed with a manufacturer until he has satisfactorily performed on the standards he already has.

This appears to us to be a very sound business position. The program has of the new policy model, tempo-

Valve Talk

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by Marvin Miller,
Senior Member, American Welding Assoc.





How about the engineers?

Not the design engineers, but all the slide rule experts who—in anonymity—help create new aircraft, then take a quiet back seat to the planes, the boss and the test pilots.

Ironically the chief engineer is confined with a new design, not because he pushes himself into the publicity spotlight, but because it would be impossible for a newspaper or even a magazine to give credit to everyone who has a share in a development. So the top men in aeronautics naturally choose to represent engineering.

Yet behind the scenes hundreds of men who do the necessary hand work, and fight out the myriad individual problems in solution that result finally in the completed airplane.

What kind of men are they?

In the first place they're dedicated to their work, motivated by intense interest, years of formal training and acceptance of challenge.

By and large, they're creative, independent thinkers and their ideas provide a constant stream of solutions for the company, some large, some small, but all vital in continuous development.

Finally they are used to quite drastic, sometimes the company and understanding of other engineers. In fact it has been reported they play bridge with slide rules! There's no doubt they are conservative as a class and apply the same analytical thinking to political and economic questions that they devote to engineering problems.

In the industry's previous slump, aircraft engineers found the going rough. They were fairly depressed.

But with the resumption of air power and many demands for special aircraft and machinery—particularly in the mobile field—the engineers found themselves more at home.

So needed in their work today, for instance, that the acquisition of a new aircraft bomber on a jet fighter can be quite nearly as many thousands of dollars as the design of a World War II combat plane.

The engineer occupies his four years of college training and follows through with night school and intensive courses to keep his skills abreast of the problems that confront him. Ordinarily he

starts in layout work, progresses to checking and engineer classification and from there to final man, group engineer, design specialist, staff engineer, assistant project engineer and project engineer—a long trail of at least 13 years.

And he might work in any one of several divisions from aerodynamics to hydraulics, from power plants to electronic systems, test, etc.

Unfortunately the nature of his success is not always predicted on his abilities with new ideas, new materials and new aircraft. As an enemy of the machine, he is often driven to drive home his ideas, along with personality.

Individually most engineers are not too concerned with public credit. They avoid the limelight or do so gradually and unobtrusively and experience is considered. They're for either the praise of their superiors and the pleasure of their coworkers than hit the public eye. And the stars that, of course, in one day projects achieve success.

But ahead—always—no more projects, more critical requirements, more technical problems.

And because the aircraft engineer is finally making the engineer by design, he will continue to go with it, back in better safety and better working conditions, even to specially designed buildings for his own. He's not efficiency. He's really working and there should be no further reason about themselves denied for his skills.

Whether they're in it or out of it, these men who are the guts of defense company success and smaller manufacturing concerns, are. Without them there would be no aircraft industry.

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only, to reduce the rate of new obligations, but it has not reduced the rate of production. The placing of follow-on contracts earlier than required to maintain uninterrupted production merely increases the industry's backlog of unfilled orders and not the number of aircraft and other material delivered to the Air Force.

The small amount of Air Force obligations for aircraft and related procurements during the first ten months of fiscal year 1954 has given rise to considerable conjecture and comment. Let me state, without reservations, that this lag in obligations does not imply a delay in currently programmed aircraft deliveries. Neither does it imply a real drop in future aircraft deliveries.

OBLIGATIONS

There are a number of very cogent reasons why Air Force obligations for aircraft and related procurement were so small during the first 10 months of the last fiscal year.

First of all, the only obligation figures regularly reported by the Service, are net obligations, that is total new obligations less disobligations. In fiscal year 1954, the Air Force estimates that approximately \$1.7 billion of aircraft funds were obligated. Since disobligations in that year were about \$2 billion, net obligations amounted to only \$1.7 billion.

Second, the Air Force has been making an intensive effort to get its procurement program on a sound, cost-basis basis, to eliminate practices which have been criticized by the Congress and the General Accounting Office and, in general, to introduce more businesslike buying procedures. Many of the serious failures in this effort, such as the former purchasing policy which I have already discussed, have had the effect of temporarily postponing the placing of new contracts and, in some cases, causing the disobligation of funds.

The Air Force has just completed a rather detailed study of the factors contributing to the delay in new obligations during fiscal year 1954. The net obligated balance in the Aircraft and Related Procurement appropriation at the end of that fiscal year is now estimated to be \$4,900 million. Of this, \$1,645 million is reserved for application against the fiscal year 1955 program. The balance, \$3,255 million, represents funds which were originally obligated for obligations in fiscal year 1954 and which are still reserved for fiscal year 1954 and year's end program.

The study indicates that almost two-thirds of this "unexpended" obligated balance of \$3,255 million on June 30, 1954, is available to new orders, that is, the former purchasing policy, to which I have just alluded, and the new year's procurement policy which I shall discuss in a moment. The fact that these

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square-foot plant, manned by a well qualified management team and abundant skilled manpower, is 200 percent privately financed, proof that we are in the aircraft business to stay. All our new machines and equipment were planned and purchased by our Aircraft Products and U. S. Government Procurement Agencies' co-possible money-saving system.

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fully assumed obligation at the end of the fiscal year should only in case for items more their obligation in fiscal year 1954 was not required under the new procurement policies.

SPARES POLICY

With respect to the spares policy, it had been the practice of the Air Force in the past to include in aircraft contracts a lump sum amount to cover the total estimated cost of future engineering changes, spare parts, training equipment, special tools, etc.

The General Accounting Office pointed out that the contractual provision setting up these lump sum amounts did not encourage performance by the contractor but required substantial action by the Government contracting office, when the requirements for engineering changes, spares, etc., were finally determined.

In effect, these lump sum amounts included as obligations were not a true liability of the United States Government and, therefore, were not true obligations.

The new policy discontinues this practice. Funds for engineering changes will not be obligated until the changes have been determined and directed by the Air Force. Spare parts amounts will not be obligated until the spare parts requirements have been determined both as to items and quantities and placed in order.

The net effect of this action was to reduce the amount of new obligations in fiscal year 1954 below the original estimate which included this type of payable obligation. This same policy resulted in the discontinuation of \$150 million (of the \$2 billion total) during fiscal year 1954, representing the reduction of consolidation of spare contracts for which delivery lots of items to be produced were not available.

Again I want to point out that this new dependable practice will aid in any way delay the actual production of spare parts in the introduction of new step engineering changes.

CONTRACTING

Another new policy introduced by the Air Force within the last year practices, in a general rule, the placing of new contracts with a contractor where contract liquidation or price matter situations is just due on existing contracts. This action was taken to provide an incentive to both the Air Force buying personnel and the contractor to bring up to date all contracts on which price refinements or contract finalizations were delinquent, another matter enforced by the General Accounting Office.

This action also contributed to the reduction in new obligations during fiscal year 1954, but it was not allowed to delay production. Now this same

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obligations have been unmet, the government of new contracts are entered on schedule.

I was pleased to note in the Air Force study that \$96 million of the amount obligated in the aircraft appropriation during fiscal year 1954 was the result of such prior recommitments.

LETTER CONTRACTS

The Air Force, in the past year, has greatly increased the use of letter contracts for the procurement of aircraft and other major items of equipment. Included contracts are now the rule and the letter contract is used only in

exceptional cases. Like it or not, it should be so. The letter contract was never intended as Government procurement as a substitute for a finished contract. It is to be used only in exceptional cases and at times of emergency. Where used, it is to be replaced at the earliest possible time by a definite contract.

The Air Force action tightening up on the use of letter contracts was long overdue, but it has served to reduce, temporarily, the obligation of aircraft funds. The Air Force buyer must now complete his contract negotiations, including specifications and all other terms of the agreement, before the money is obligated rather than after, as

in the case where a letter contract is used.

I feel confident that in the long run this action to avoid letter contracts will speed up the procurement of aircraft and other major equipment rather than delay it. Both the Government and the contractor will know better where they stand and the possibilities for misunderstandings and disputes will be reduced.

One final point on this aspect. Purchases by one military department through another military department will no longer be reported in obligations until the funds are actually placed in contract and the Government incurs a liability. This change in policy also contributed to the recent reduction in the rate of obligations.

It is estimated in the Air Force study that two-thirds of the "unplanned" unobligated balance of \$640 million in the major procurement account as June 30, 1954, represented Air Force purchase requests transmitted to one of the other services but not yet reported back as being placed on contract.

NET OBLIGATIONS

I believe it is quite clear that the relatively low level of Air Force net obligations for aircraft and related procurement during the first part of the past fiscal year reflects, essentially, the introduction of more conservative buying practices in Air Force procurement. Now that the transition to the new government ground rules has been substantially completed, the rate of obligations is beginning to rise sharply.

Notwithstanding of aircraft funds in May, 1953 million, were 20 percent higher than the total net obligations in the first 12 months of fiscal year 1954 (see figures at end of this article) but the Air Force estimates that net obligations of aircraft funds in that month will total \$906 million, twice the May figure.

The adjustments in procurement practices and improvements in procurement procedures, which I have described, have not, and will not, delay the 1953 wing build-up. Indeed, I am firmly convinced that the severe values in the last year will assure the successful accomplishment of that goal.

PERSONNEL

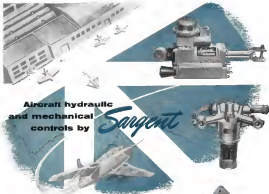
Great progress has also been made by the Air Force during the last year in reducing its military personnel program. Personnel requirements have been given a very careful scrutiny. The Air Force now feels it can meet the 137-wing program with 973,860 military personnel. Two years ago the Air Force stated to the Congress that it would require 1,215,000 military personnel to man a slightly larger force of 145 wings.

This reduction is certainly pronounced.



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improvements has been achieved without detracting from the constant advancement of the Air Force. Reductions have been made in many of the areas reportedly estimated by the Congress—Air Force funds, as points, headquarters personnel, training personnel, vehicles personnel in jobs which can be done by civilians, etc.

With respect to the last item, the Air Force "Native Son Project" alone promises ultimately to reduce military personnel requirements overseas by some 41,000. More than two-thirds of this reduction has already been realized. It is planned also to curtail this concept to the Continental United States by substituting civilians for military personnel in areas where such interchange is feasible and economical.

The early release of assets whose terms of retirement were close to completion and who had an abundance of schooling, together with the early release of those assets of marginal value to the service, has placed the Air Force in a much better position to meet the large-scale increases anticipated in fiscal year 1955. The Air Force, however, still faces a very difficult recruiting problem.

The end fiscal year 1955 goal is 970,000 men, an increase of 20,000. Because of the very high number of separations expected in fiscal year 1955, this net gain of 20,000 cannot be secured without a major recruiting effort. To assist the Air Force in meeting this problem, the Secretary of Defense has recently authorized a separate recruiting service for the Air Force. The Defense Department feels that the problem of men being placed on reserve status can be solved.

TRIBUTES

My President, the last year has been a trying period for the military and civilian leaders of our Defense Department. I cannot close my remarks without paying tribute to the patience, courage and devotion to the extreme without demonstrated by these men and their subordinates in the Pentagon and in the field commands.

The Air Force has been engaged in a rigorous reorganization of all parts of its program and is making drastic changes in its way of doing business. These changes are now receiving the wholehearted backing of all Air Force personnel. The new program is being pushed with a vigor and determination which is certain to assist its success.

The new training and procurement policies are being rapidly implemented and loyally supported from top to bottom of the Defense organization. The people of this country have every reason to feel secure in the knowledge that our Nation's defense is in good hands.



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Pylon fuel tanks along the lower wing surface of the U.S. Air Force's Northrop F-89D increase in range without appreciably affecting speed. In order to prevent ice accumulation on the leading edge of the pylons, COHRLASTIC heaters providing multiple wattage densities for maximum in heat distribution to required areas were designed, in cooperation with Northrop Aircraft, Inc., engineered and produced as complete assemblies by the Connecticut Hard Rubber Company.

Special silicone rubber heating blankets sandwiched between aluminum covers were preformed and mated as complete assemblies. No change in the critical shape of the pylons was required because the outer surface of these light-weight, compact and

rugged heaters provides the shield surface.

All COHRLASTIC heaters meet MIL and AF specifications. They are easy to install, easy to control, and can be adapted to any size and shape. Exclusive construction features enable these heaters to provide uniform heat distribution for unlimited durations over large or small surfaces. COHRLASTIC heaters operate trouble-free in temperatures that range from -100°F to +500°F.

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Theodore von Karman (left), DAF advisory board chairman, and Daniel G. Baum, DAF president.



Richard F. Gumpert (left), DAF president, and Daniel G. Baum, DAF president.



Hermann Orth (left), DAF president, and Paul Demert, DAF president.

Space Flight Needs Only Money, Time

By Frederick C. Baum, III

Frederick, Austria: The feasibility of space flight is no longer a topic for academic debate, but a matter of time, money and a program.

In these words are summed the theme of the fifth annual Congress of the International Astronautical Federation, recently concluded here. Data taken from rocket and astronautical statistics of 37 countries, representing 7,600 professional level members, pointed out that the borders of space flight are being pushed. They said the first space craft—an unmanned satellite vehicle—would be simply an extrapolation in magnitude of current high-altitude and high-speed rocket-powered flight.

And they stated that progress in research and development on sounding rockets, guided missiles and manned flight in rocket-powered aircraft has benefited astronautics greatly because of the many problems to be solved.

■ **Who Was There?**—A cross-section of the scientific community attended astronautics: chemists, flight engineers, physicists and rocket engineers, specialists in communications, astronomy, mathematics and thermodynamics.

The susceptibility of astronautics at top professional levels has evolved only in the past several years. Not long ago, few scientists or rocket engineers would spend much on the subject of space flight. If they did, they were apt to get sidelong glances from their colleagues and to hear the disparaging label of "Black Rogers." But realization of the close relationship between the feasibility of astronautics and the rapidly expanding science of astronautics and rocketry has been speeding through military re-

search and development activities.

It is significant that such progress usually comes from USARF Scientific Advisory Board chairman Prof. Theodore von Karman, and NASA director Dr. Hugh L. Dryden attended the Congress. Both von Karman and Prof. Hans Thiering, Vietnamese atomic physicist, addressed the session.

When in astronautics were colorful figures from the early history of the new science: Prof. Hermann Orth, Bruno Gluck von Pongrat, Dr. Eugen Sänger and Ing. Rolf Engel. Orth and von Pongrat were the devoted classical theory of space flight as far back as 30 years ago, setting out the concepts of step rockets and satellite vehicles and pointing out their importance. Sänger and his mathematician wife, Dr. Irene Brück, wrote a preliminary design proposal for a long range rocket bomber before the end of World War II. Engel was one of the few members of the original German rocket society.

Confidants of Ponomarev, who flew Gerson V-2 rockets were also present, with their former commanding general, Dr. Walter Dornberger, now

a consultant to Bell Aircraft Corp.

■ **Technical Session:**—During the technical sessions, 32 papers were presented in English, German and French. The wide range of subjects considered further emphasized the complexity and the high scientific level of astronautics.

Papers were given on problems of space medicine with emphasis on cosmic radiation hazards, high temperature resistant materials, thermal insulation, guidance and control, orbital flight systems, artificial satellite design, astronautics, aerodynamic testing problems, propulsion systems and services of astronautical programs.

Some writers considered immediately practical topics, and others considered basic theory or projected their thinking 20 to 30 years in advance.

Of special interest to many observers was a film showing at U. S., French and former German developments. The French footage included shots of rocket motor development at Vincennes and test firing of the Véronique at Colombes Becker, French Morocco. Véronique is a sounding rocket similar in design to the Aerobee but with an augmented mechanical system for initial development (Aerobee Wings, Apr. 5, p. 18). According to Prof. E. Vann de Pommé, the Véronique reached an altitude of 54 miles earlier this year.

Summaries

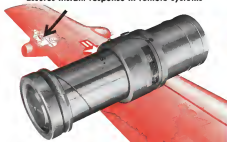
Of the many papers presented, three few have been selected for summarizing as representing a typical man's notion of IAF astronautics opinions.

■ **High-Performance Reentry:** Scientist Stanislas Maréchal—Dr. R. Korfus and F. Demert, Plesenceville, Reunion.

An examination of current problems

BENDIX-PACIFIC SELF-DISPLACING HYDRAULIC ACCUMULATOR

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Bendix-Pacific Self-Displacing Accumulators can effectively serve as an instantaneous fluid source in remote installations and in closed surface control systems.

The Accumulators incorporate double pistons and double pistons (piston and ball) that the ball opens up a low-pressure accumulator while the second ball acts as a double-acting valve.



The recently designed hydraulic accumulator requires simple design changes to replace the ball, the opening of the ball opens up the accumulator and allows the fluid to flow into the accumulator. The ball opens up the accumulator and allows the fluid to flow into the accumulator. The ball opens up the accumulator and allows the fluid to flow into the accumulator.

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The ball opens up the accumulator and allows the fluid to flow into the accumulator. The ball opens up the accumulator and allows the fluid to flow into the accumulator. The ball opens up the accumulator and allows the fluid to flow into the accumulator.

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HYDRAULIC



TELEMETRY



ELECTRO MECHANICAL



WINDING



metallurgy production techniques and a consideration of some of the principal developments was presented by the author.

► **Graphic Significance of a Modern Seafire Vehicle**—By T. M. Lantz, director, Felt Photographs, Philadelphia.

Three possible uses of a 250-mph. aircraft, sea-plane-weight unit are considered: reconnaissance, support, the destruction of the enemy's transport ships, and demonstration of the G. The author would like to see no demonstration, but would be inclined to use it as a self-defense unit.

In response, the big difficulty is losing the big, earth mass with

against to the other, because of the problem of maneuvering accurately long distances over water. Thus although the land masses of Europe and the United States are well-served, the coast pattern with respect to each other is not known within several miles.

► **The Influence of Turbopump Design upon Performance of Liquid Rocket**—By H. H. Koelle, Stuttgart.

The author examines the advantages and disadvantages of various types of turbopump systems with respect to the performance of liquid rockets. Twelve design parameters are related to burning times.



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Shelton, Mass. plant uses a wide variety of hydraulic and pneumatic equipment.



Hartford, Conn. plant produces electronic tube testing units and other electronic equipment.

► **Protection of Humans from Heavy Neutrons of Cosmic Radiation in Regions Outside the Atmosphere**—By H. J. Jurek, U.S.N. School of Aeronautics, Andrews, Texas.

The author suggests that a calculated risk of exposure to heavy neutrons may be taken, such as is the case of exposure to ultraviolet light. Such exposure would not result in immediate incapacitation of the crew because the effects might take weeks or even months to cause observable tissue damage.

Heavy particles are completely stopped when they hit a solid stopped of orbital electrons, traveling through space at immense velocities. Because of the extremely high energy of these particles, conventional systems of measuring radiological effects are inadequate and an alternate method is now needed: "specific reactions" and "cellular biological observations" are discussed and the physics of shielding are discussed.

In considering shielding for man in space vehicles, it is pointed out that this problem is apt to be more than met because of a cooling mechanism in specific reactions. Some design required shielding for complete protection indicates an extreme weight problem.

► **Space-Equivalent Conditions Within the Earth's Atmosphere—Physiological Aspects**—By H. Stenlund, Head, Dept. of Space Medicine, USAF, Randolph AFB, Tex.

The reproduction of static and dynamic conditions of space flight, with respect to the physiological effects, is considered for flight within the earth's atmosphere.

The effects of air atmosphere gas are not disappearance of oxygen from the air upon man as recommended. Static space equivalent conditions such as solar and cosmic radiation and magnetic field of the earth.

The state of man in space is it is considered in light of a dynamic space equivalent condition. It cannot yet be determined whether the prolonged effect of weightlessness upon man will become a serious medical problem or merely an interesting physiological condition.

► **Fundamental Research in Molecular Reactions of Combustion**—By Leon Sengier, Zurich, Sw.

Original combustion and non-oxidation studies do not provide the fundamental understanding of hydrocarbon combustion reactions; a new experimental method of "mixed molecular beams" is presented.

► **Research in Nitrogen Combustion Products**—By E. Sengier, Zurich.

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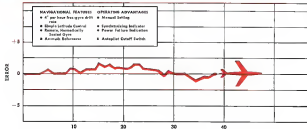
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New G-E automatic a-c electrical system



New G-E high-efficiency a-c generator has no harmonic over 1%, and offers full performance in about 1/10 sec. Available ratings: 30 to 80 kw, 330/430 cycles, 1700/1800 rpm, 120/200 volts.

New G-E compass system reduces aircraft



Low drift of gyro system proved in laboratory and flight tests. The above drift curve was obtained during a self-check (zero test) at a 50° gyro tilt. This test, conducted by an outside equipment laboratory, showed that in no time did the drift rate exceed 4° per hour—10-30% reduction over previous systems. Right test conducted late April at the laboratory facilities.

delivers load at 260F

A new, fully automatic parallel a-c electrical system which simulates normal manual switching, and delivers rated load at higher ambient temperatures than ever before possible, has been developed for jet aircraft by General Electric.

Designed for automatic dash

Designed specifically to meet the high non-air temperatures of automatic dash, this new G-E generator system provides the best voltage regulation and most advanced system protection available in production today. The automatic system delivers full load at:

- Sea level with 134 F cooling air at 5 inch water drop (continuous)
- 50,000 feet with —40 F cooling air at 5 inch water drop (one minute)
- 50,000 feet with 140 F cooling air at 30 inch water drop (one minute)
- 35,000 feet with 260 F cooling air at 1-inch water drop (one minute)

Speeds take-off, saves pilot

The first completely automatic a-c system ever produced, the new G-E equipment begins operating as soon as the pilot starts an engine. The system contains only two toggle switches, which can remain "on" at all times under a fault condition. This duration a series of pilot functions, and simply releases time required to become airborne after the pilot checks with the cockpit. System control and protection is fully automatic.

Single source for complete system

General Electric offers a single source for complete a-c and d-c power generation systems for any aircraft. For more information, contact your nearest G-E aviation specialist, or write Section 319-60, General Electric Company, Schenectady 5, N. Y.



Major components of the new G-E system is sensitive to the generator size.

1. New static regulator (left)—designed to test the life of the aircraft's engine regulator is only 370 cubic inches and weighs only 12 lbs.
2. Control and protective equipment (right) automatically isolates and isolates any faulty generator. Control panel weighs only 80 lbs. for a single-engine system and only 180 lbs. for parallel generator systems.

drift rate 66 — 80%

A new compass-controlled directional gyro system which offers a four-gyro drift rate of only 4° per hour—66 to 80 per cent more efficient than present systems—has been developed by General Electric for helicopters and lighter aircraft.

Weights only 17.5 lbs.

Compact and lightweight (approximately 17.5 lbs.), the MA-1 compass system is designed to meet the requirements of any sophisticated aircraft installation, and will operate from all compass transmitters built to Air Force specification AF 1263.

Accurate, modified heading information

The MA-1 system offers accurate, stabilized heading information continuously through 360° of yaw when dived to the earth's magnetic field through a modern vectoring magnetic compass. By turning a control dialing rate of approximately 1° per minute during compass controlled operation, the MA-1 system also provides for controlled latitude drift compensation.

Aircraft system development

For additional information regarding reliable aircraft system development, contact your G-E aviation specialist or write Section 319-60A, General Electric Co., Schenectady 5, N. Y.



1. Amplifier provides a junction box for various components and power source as well as containing leveling, shoring and shock absorbers, same unit with dynamic follow-up and input systems.
2. Controller is used in conjunction with the magnetic indicator for setting directional heading and latitude control and for general operation of the system.
3. Modified gyro, heart of the G-E system, is a simple, low-cost, mechanically modulated gyro used to obtain a stabilized heading heading.

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New G-E armament system gives jet bombers

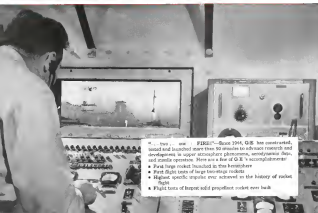


This new 28 mm system is a result of G-E's "integrated system" approach whereby a group of engineers is responsible both for development and maintenance of a system for greatest efficiency and ease of maintenance.



Cold and hot chambers with temperatures ranging from -60 F to 1700 F are only two of the elaborate tests G-E armament systems undergo to help insure maximum flight efficiency.

New land-sea-air uses for rocket propulsion



"...two... one... FIRE!"—Since 1944, G-E has concentrated, tested and launched more than 90 missiles to advance research and development in upper atmosphere phenomena, aerodynamic flow, and missile operations. Here are a few of G-E's accomplishments:

- First large rocket launched in the hemisphere
- First flight tests of large two-stage rockets
- Highest specific impulse ever achieved in the history of rocket flight
- Flight tests of largest solid propellant rocket ever built

automatic defense

A remote-controlled 28 mm armament system, capable of loading, tracking and hitting hostile aircraft even in the night or fog, has been developed by General Electric for high-speed jet bombers.

"Packaged" protection for B-47E and B-47E
Under security wraps for three years, the G-E fire control system provides more reliable, automatic protection for the Boeing B-47E and B-47E jet bombers. Compact, the 28 mm system is delivered packaged, tested and ready to be installed as a complete sub-system.

- Automatic warning, tracking, correcting
The system performs the following functions:
- Provides automatic radar warning of approaching aircraft
 - Automatically tracks and positions guns on selected target
 - Continuously corrects for windage, ballistics, and lead errors by means of an electric computing network
 - Fires guns electrically when target is in range

System Engineering
Radar survival is increased as a result of this integrated, efficient, compact system. Compact system requires no one reason why almost every U.S. operational heavy and medium bomber today is equipped with General Electric armament systems. General Electric Company, Schenectady 5, N. Y.



Remote-controlled G-E armament system gives the Boeing B-47E and B-47E jet bomber a heavyweight punch in the air. Guided by radar, the 28 mm system can track and hit enemy targets.

under study by G.E.

Two years ago, rocket propulsion had but one use... to launch missiles. But today, rocket power as a source of high pressure, high speed, high temperature gases and power can be used in such applications as turbine propulsion, rocket motors, high-speed flight, thrust augmentation, rocket booster and sustaining power, high-speed research data, glider take-off and landing, supersonic wind tunnels, mining, plus many additional latent military and industrial uses which will be brought out by research and development.

Experience, manpower and facilities make it possible for G-E to design and develop rocket motors or rocket propulsion systems for use on land, sea or in the air.

The amazing growth of rocket propulsion offers a challenge to the ingenuity and ingenuity of American industry. The challenge—to apply the tremendous power of rocket propulsion to ever-wider applications—can be met only through continuous research and development. To this end, General Electric offers its successful experience, its trained manpower, and its extensive facilities. General Electric Company, Schenectady 5, N. Y.



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Allison Streamlines J33 for Matador

• Piloted-plane engines also benefit from tricks learned in converting jet for one-shot missile use.

Missiles and their power plants, because they are one-shot items, should combine reliability and production economy, but at no sacrifice in top operational reliability.

This pattern was followed in the design of the Matco B-61 Matador (Aerovox WMA-50, p. 28), p. 28) and was rapidly applied to the powerplant for the missile—the J33-A-17—by Allison Division of General Motors Corp.

• **Worthwhile Aesthetics**—Although designed for expendability, the contractor flew the engine in sustained for 100% reliability during its short flight life.

It is a special modification, for missile power, of the basic, unstreamlined Allison J33, which has relied up more than 21 million field hours in such planes as Lockheed's P-80, T-33, F-86 and F-84A night fighters and Convair's F-102, F-104, and F-105.

A J33 also powers Chance Vought's rocket-propelled missile—the Bumblebee—and another missile, the details of which have not yet been cleared for publication.

• **Change Benefits**—For the missile application, Allison designed a J33 featuring reduced external, streamlining and testing costs, while more increasing complete reliability. This special program brought these outstanding results.

• **Major changes** in basic engine design.
• **Cost reduction** of 30%.
• **Critical materials** reduced 50% in comparison with the J33 built for piloted aircraft.

Finally, Allison was able to apply successfully to its piloted turbine engine some of the processes and materials learned in the development of the missile engine.

• **Exterior Details**—A new material for turbine buckets was developed by General Motors Research Laboratories. A new alloy capable of sustaining its true properties at least 1000° before then the forged, external compressor case, the new GMR 735 has afforded a considerable reduction in critical metal use.

The missile engine was the first production application of the material. It



B-61 MATADOR MISSILE launch rail on one-way flight. (Copyright © A-1)



MODIFIED J33-A-17, incorporating important material and production changes.

is now released for use in all Allison turbojet and turboprop engines.

• **Exterior Coatings**—Another development that helped to cut critical material use in the missile engine is an aluminum dipping process, perfected in cooperation with General Motors Research.

The process is applied to the main combustion liners, which are made from a low alloy steel instead of Inconel, a critical material. The aluminum dipping gives corrosion protection, permits the liners to withstand combustion chamber temperatures.

Allison, which claims to be the first to apply aluminum dipping equipment to large parts, now uses the process on turbine engines scheduled for pilot use.

Aluminum painting and aluminum nitrate-spraying also would provide sufficient surface protection for non-

critical materials during engine operation, Allison found. Almost all of the streamlining steel in the combustion section of the missile engine was replaced by relatively inexpensive low-grade steel. A low-carbon steel treated with heat-treatment paint is used in the engine's ring and tube assembly.

Research proved that low critical materials could replace critical steel in the piloted version as well as in the missile engine.

• **New Exhaust Section**—Allison also designed and developed, at Wright's request, a one-piece exhaust cone and shroud of aluminum-cast, low-carbon steel capable of withstanding temperatures up to 1,550°. The combustion unit is designed to hold engine temperature within a 30 deg. range.

It is dropped directly on the point of usage, whereas with the piloted version of the J33, the exhaust combustion

How Missile Engine Compares With Conventional J33 . . .



EXTERNAL COMPARISON of modified J33-A-17 for missile use (upper half) and conventional J33-A-13, latest version for piloted planes.



FEWER ACCESSORIES not built into rear section of missile engine (left) equipped with more complex piloted plane J33 (right).



WEIGHT SAVINGS on missile engine, left (modified J33, right), include use of single, starter-generator, deletion of inlet screen.



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The program even included modifications of the machine blank. Previously this was constructed of an expensive grade of asbestos with a solid lacrated foil binder. It was replaced with an inexpensive asbestos filler and a stainless steel wire screen binder.

► **Shop Like Savvy**—Big savings were effected in manufacturing and assembly.

- Dimensional tolerances were relaxed.
- Machining time and materials were

* A 50% reduction was made in the

*Screw linkages were eliminated in new design components

* Boring were placed directly into the suspension housing, thus eliminating steel boring tags in the suspension near cuts.

* All painting for appearance purposes was discontinued.

• **Not Needed**—All components not required for a short life engine were removed. A weight saving of 33 lb is realized by using a single starter and generator, eliminating the starter generator and clutch.

Steering, fuel control and sensors



CONCENTRATION LINE before (top) and after absorption (in).

Emergency fuel system and on or lot status have been removed from the

► **Test Time Reduced**—The test program, too, introduced worthwhile changes.

Normal requirement for a pilot engine-150-hr. qualification test—was shifted to one 3-hr model test on these different engines, for the main powerplant.

Acceptance testing of production engines was shown from 5 hr of initial and final time to $1\frac{1}{2}$ hr of final test only.

• **Compatibility Kit**—The final acceptance test on the waste engine is set up in two phases. One is to demonstrate performance; the second phase is to check the operation of a Martin Jet. This is an engine backup propulsion kit consisting of three items normally installed by the aircraft manufacturer before engine installation. Included are the hydraulic pump, throttle actuator, hydraulic hoses, backflow, fuel hoses, drain lines, electrical harness and disconnect units.

Allison installs and tests the components of the Martin Jet. Thus, the accepted engine may be shipped directly to the operating organization for field assembly by certified personnel, bypassing the shipment to the engine manufacturer.

► **Began in 1980.** Development of the engine was undertaken by Allison in October 1978, when Martin, under contract with the USAF, asked for



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It takes a month of intensive studies by a trained team of parts supply specialists to establish proper spare parts levels – but the costs you savings? Your lead time will be reduced on your inventory turns over. For example, we reduced the lead inventory time from 120 days to 60 days for one of the leading airlines without creating a single operational delay. Within a few months, that lead time was further reduced to 30 days – releasing capital for other uses while increasing their capacity of assets.

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type. We are one of aviation's major engine and engine-driven accessory overhaul bases. We live with the problem of spare parts inventory. — Maintaining a million dollars' revolving inventory at all times. We know what shelf-life deterioration means. And what a shelf-bound inventory costs in terms of idle capital.

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through combination. The central stock is smaller – it is always fresh – and always adequate – yet never costs more than you were sure for each item.

We would like to sit down with you and talk over the details of our sportsman supply plan. Our method of saving your money is simple, uncomplicated, easy to explain—backed with success stories. Give us just 15 minutes of your time to prove it. Why not call or visit ALPACOCK at Milwau, Washington, or Miami today?

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GROUND SUPPORT SYSTEM for four B-47s. Dual unit, right table, cabinet

generating Co., and the Caterpillar Tractor Co.

► **Standalone Unit**—Here are details about the Boeing B-52 and surrounding, more powerful machines flow air has in the field.

► **Current model**, designated the Boeing 502-TD, consists of two cubic, mounted Boeing 502-series gas turbine engines, driving air compressors which deliver 140 air hp per unit. In the present production unit, the two compressors output is recombined together to produce a total of 280 air hp. The two turbines (which are water-cooled) with fuel tank, instrumentation panels and air flow control are mounted on a trailer.

The output of a single 502-TD compressor—140 air hp—provides 90 lb-per minute of air at an absolute pressure of 53 psi at a temperature of 475 °F.

► **A later model** air compressors built by Boeing supports the flight test program of the company's 707 jet liner. The present prototype, labeled the 502-11, the unit is similar to the 502-TD but has increased output. The 502-11 produces 150 air hp—air flow of 120 lb of air per min at 51.3 psi and 470 °F.

► **Still another design**, the Model 161-11B, based on the improved flow rate Model 502-11 air turbine power plant, is in the development stage. This unit's output has been pushed to 210 air hp—air flow of 140 lb per min at pressure and temperature must be those of the 502-11.

Despite Aircraft Co. uses Boeing portable air compressors in conjunction with its B-52 two jet reconnaissance planes. Northrup Aircraft has the units in service in its research and development program, according to Boeing.

To date, Boeing compressors have accelerated some 1,000 lb of operation—equivalent to well over 1,000 jet starts, the company adds.

► **Standalone Unit**—The B-47 ground support system is considerably more involved than the standalone unit—B-52 unit. This is primarily because the B-47 system is designed to support four aircraft at once and also is capable of

simultaneously handling A/C power in the plane's electronic equipment in addition to providing power to start the engines.

The B-47 ground support system is made up of three main elements:
► **Fixed electric unit**—This trailer-mounted unit consists of a D16A, V-type diesel engine operating at 1,700 rpm. It drives a Marathon 254-448 V., three-phase, 60-cps, 150 kw. generator. The trailer houses in a waterproof enclosure all other pertinent equipment including the radiator, fuel tank and switches plus winterizing provisions to handle temperatures as low as -65 deg.

The diesel engine features a Caterpillar-designed and -built machine system which permits the engine to operate at a light load (such as when providing 900-cps current for engine equipment maintenance) and pick up continuously to full load during jet engine starts.

The diesel engine is an unregulated (PM) jet engine fuel, thus do not require their own special fuel supply. And the engines were designed for easy maintenance. Example is that all pistons and main or connecting rod bearings may be changed through in-service disassembly valves can be changed in three minutes and all injection valves or nozzles are interchangeable and do not require balancing.

Fixed electric unit control equipment and software is designed and manufactured by Electric Science Engineering Co.

► **Distribution cabinet**—The four-unit distribution cabinet provides electric power from the fixed electric unit and distributes it to the four receiver units and their motor generator sets, one of each of which are used with each B-47. The distribution cabinet contains all circuit breakers, control switch, control power transformer, the main bus and terminal block for cable connections. The power circuit breakers are motor operated like a continuous air valve of 145 mm and an interrupting capacity of its power of 25,000 rms value. A manually operated air



Plus or Minus errors are expensive when valuable aircraft equipment is being started, serviced, or tested. Consolidated load banks provide a wide range of protection for electrical systems and components.

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18 1000 load bank unit, not a Consolidated 1001 unit, starting and testing for jet. The load bank is 18 1000, 1000 rms AC, and 1000 watts, 20 x 40 x 40.

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AIRCRAFT EQUIPMENT DIVISION
ELECTRIC ENGINEERING

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cost. Inertia is also included plus a transfer switch to allow the system to draw its power from a conventional power station.

• **Rectifier trailer.** Like rectifier trailer comes complete with its own control system. The trailer recognizes all necessary rectifier status, instruments, switches, relays, protective devices, interlocks and provides output cables to provide the d.c. power required by the airplane. The two trailer systems are rated at 750 amps at 25.5 v. They include magnetic ampere-hour meters and current limit regulation and filters. A difficult task, which the unit accomplishes. Output voltage, during changes

from no-load to full load, remains constant within rated value at 0.2 v. • **Motor generator trailer.** This unit contains a 400-cyclic, synchronous drive motor with motor driving two 400 cycle generators mounted in a single frame. One has an output of 20 kw, 115v, single-phase. Other's output is 175 kw, 115v, three phase. The output voltage modulation of the 400 cycle generators does not exceed 1% from no-load to full load. A constant voltage output +1% of the adjusted no-load voltage is supplied over the entire required range. Micrologic permit manual setting of the no-load regulated output voltage.



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Telling the Market

High-speed steel straight fluted chocking members are featured in circular design by Pratt & Whitney, West Hartford 1, Conn. • **Boil-die 150** low vibration and shock mounting for industrial applications, White Rockstone Aviation, Inc., Teletown, N. J. • • **High Vacuum Furnaces, Their Use and Application,** a new handbook, Bulletin 750 being distributed by E. I. Siker Machine Co., 2950 Taylor Rd., Philadelphia 20. • **"Plant Maintenance Cleaning Guide,"** a 10-page booklet, may be secured by writing a company letterhead to Oakley Products, Inc., 157 Racine St., New York 6.

Copies of "An Approach to Safety," an address given to safety engineers of the electric power industry, are being distributed by the John Moore Corp., P.O. Box 3, Natick 10, N. H. • • **"Object Plus,"** a 64-page picture-caption book, subtitled "Mixing Electronics and Mechanics With Object," may be obtained by writing on letterhead to Fuel A. Wiles, Dickinson Corp., Natick, Conn. Diagrams-explained (DDE) manual volume are covered in *Interplay* Bulletin 34-500 issued by Eclipse Fuel Engineering Co., 1011 Beckman St., Rockford, Ill.

Publications Received

• **The Gazette AMB—the Story of Combat Gags,** by Capt. A. G. Thompson, USAF, 426 pages, 1,800 pictures, \$1, and also *From Combat to Victory* by Captain William Paul, APO 701, San Francisco. All profits go to the welfare fund. Capt. Thompson, former lieutenant and P-51 pilot in the 71st, received the top ranking of the 11th and its predecessor the Combat Gags Contained in the Korea war. These units, commanded by 11 Gen. William Turner and Brig. Gen. John F. Hensley operated the largest and most intense, military unit in history during their support of both ground and air forces in the Korean war. Since routing for security is treated in the future of both, both military and commercial. —ARR

• **Human Engineering Guide for Equipment Designers** by G. W. E. Wadsworth, PhD by the University of California Press, Berkeley 4, Calif. 1961. Guide is intended to aid designer in making optimum decisions whenever human factors are involved in man-operated equipment.

• **Scholarship and Technology for Low Frequency Research, National Bureau of Standards Circular 515, Government Printing Office, Washington 25, D. C., 16 cents, 64 pp., 14 figures, 1 million.** Covers the most recent phase of a continuing program for the development of communication techniques applicable in various civilian electronic equipment.

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WESCON Unveils New Avionic Devices

• Show highlights include 440-mc. transistor, high-shock packaging, attenuator for traveling-wave tubes.

By Philip Klaus

Los Angeles—A new type transistor has been operated at frequencies as high as 440 mc., several times higher than any previous transistor, opening up as early as now use in CUGB and microwave equipment, a Bell Telephone Laboratories scientist revealed here during the Western Electronic Show & Convention (Wescon).

Another technical paper disclosed a new rugged packaging technique for avionic equipment, developed by the California Institute of Technology Jet Propulsion Lab., which enables it to withstand the high shock and vibration encountered in guided missiles.

Approximately 15,000 engineers and scientists got a look at the latest electronic news of 600 manufacturers exhibiting at the Pan Pacific convention, of which approximately 2,700 attended out of more of the invited visitors held during the three-day Wescon.

• **GM Avionics Interest**—Other technical papers of particular interest to the avionic field reported on:

• **Unusual type attenuator** for traveling-wave tubes (which are seeing wide use in radar and electronic countermeasures equipment).

• **Radiation tolerant approach** to digital computer design, which cuts the number of components and circuit complexity by a factor of 10 or more.

• **New transistor designs** that cause performance deterioration.

• **Temperature stabilization techniques** for transistor amplifiers, enabling them to operate over a major range of ambient temperatures.

• **"Intrinsic Barrier" Transistor**—Bell Labs' new intrinsic barrier transistor, which may eventually be able to operate at 1,000 cycles up to 1,000 mc., "opens up a whole new frontier of junction transistor devices," Dr. J. M. Early told Wescon. The experimental transistor, which modulated up to a frequency of 440 mc., was operated with a grounded base. Early reported.

If the conventional p-n-p transistor is viewed as a sandwich of impurity jet streams between two metallic electrodes the new device is a club-sandwich with an added layer of pure (intrinsic)



BELL LABS new experimental silicon high-frequency transistor is awarded in a...

junction between the (impurity jet stream) base and the metallic collector. It is referred to as a pump device.

The intrinsic region provides better movement of positive charges (holes), reduces the input and collector area and reduces the stored energy. Early said, to make higher frequency operation possible. The p-n-p construction losses collector capacitance by a factor of 10-20, he reported, and cuts the voltage of collector current with temperature by roughly half. The new construction is made higher voltage (up to 100 v.), thereby increasing its power handling capability.

Early said these characteristics for one of the new p-n-p transistors:

- Alpha Cutoff Frequency 100-120 mc.
- Base Resistance 170 ohms
- Collector Capacitance 6.4 pF
- Amplification Factor (Alpha) 0.97

In reply to a question from the floor, Early indicated that the p-n-p transistor was still in the experimental stage and might not be available for several years. The p-n-p technique appears to be reproducible in silicon as well as germanium. Early said in response to an *Aviation Week* inquiry.

• **Packaging**—Pac Minibits—Designers having trouble getting their avionic equipment to withstand the vibration encountered in guided missiles could well be interested in a new packaging technique developed by Cal Tech's Jet Propulsion Lab and described by M. G. Constantin. JPL's tests indicate that some equipment built with the new construction can withstand up to 300G



JPL TEST RIG in laboratory technique to used construction from test and measure...

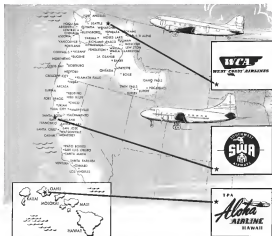
at frequencies of 20 to 1,000 cps, Constant indicated.

Constant said these characteristics lead to amplification, by as much as 200 times, JPL tests show. One piece of avionic equipment (a radar beacon), which suffered frequent tube and soldered connection failures under 5G vibration, was found to be suffering its components to 300G. Constantin said.

When the same tubes were strapped rigidly to the vibration table, equivalent vibration resistance, they could withstand 10 to 24G without failure. This led to the new wave rigid type of avionic design.

• **Doughnut Chassis**—The new JPL chassis consists of a doughnut-shaped casing, with small 1/8 inch thick cast housing tubes into which the tubes are mounted. Resistor, capacitor and other components can be mounted on curved, insulating rings mounted along the inner periphery of the doughnut, or on radial boards which cover one end. (See photo, p. 72) Several such chassis can be stacked and secured by means of through bolts. The resulting assembly has a natural frequency in excess of 5,000 cps, protecting components at vibration frequencies usually encountered.

• **Test Results**—The beacon suffering frequent failure under 5G vibration was subjected using the JPL rigid chassis, with no change in electrical energy, and subjected to several hours of vibration. At 10G, 20 to 1,000 cps, there were no failures. Constant reported. At 24-30G, the only failure occurred about 100 cps at a constant



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DOUBTHUT CHAIRS of their individual sub-assembly as designed to withstand vibration. They are mounted to water tanks, suspended inside or close to boards.



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connector. When the connector was replaced, the unit operated at 24-180G, 20-4,000 cps, without defect. The lack of solder connection failure indicates that this type malfunction is caused by conventional chassis design. Contact our facilities.

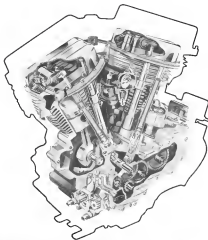
- **Other advantages**—The new regulator has other advantages.
- **Smaller Size, Weight**—The weight of the original device was cut from 174 lb to 13 lb, by converting to the liquid-charged condensation. Size was cut from 660 cu in. to only 300 cu in.
- **Improved Cooling**—Regal chills provide excellent condensation paths for removing heat. In the device tested, maximum hotspot temperature was cut from 210°F to 178°F by repackaging. Condensate reported. In addition, there were more uniform temperatures throughout the assembly.

► **Trucking Wives Attorneys**—Firms, one of the recently developed roadside finding aids, *avoids* application, has been successfully applied to the trouble some problem of preventing footfalls.

between expert and novice on traveling were measured using 7.5 Cui, et al. Bell Labs described the use of a helix helix (10 turns/wh) which is placed around the signal helical winding to increase attenuation in the back direction without serious loss of gain.

■ **Chipping Computer Completely.** A 16-megabit digital differential analyzer, using only 147 tubes and 189 diodes (plus power supply), occupying a space of only one cubic foot, was described by Floyd Steele, head of Digital Control Systems, Inc. (Steele was one of several Norfolk engineers who developed the Modbus digital analyzer, later named Computer Research Corp.)

By making the magnetic resonance drain perfusion functions previously requiring tubes and dyes, and by use of multiphase (X-ray) imaging, Steele and his digital computer team, complexity, and presumably cost, could be greatly cut, possibly by a factor of 10 or more. Under these techniques, Steele says



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Performance curves for the 3-hp motor highlight the efficiency of these new a-c motors and their ability to handle loads from sea level to 50,000 feet. Greatly simplified and rapidly compared, they handle even higher momentary loads for temporary demands, especially at altitude.

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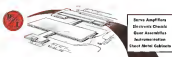


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5000, Hakey reported. The gun version of gun-sensor transducer can be cut to only a "few pounds" by cascading several stages, but this adds complexity and cuts bandwidth, Hakey said. The technique does not work well with gun-sensor base for lots of gun, he added.

• Since developed two die-cast, closed-circuit which enable gun-sensor transducer, rated for 400 operation to be operated at 50C with less than a 10% gain change. He predicted a "significant extension of the operating frequency range of transducer" when such included, techniques are employed.



REMEL's sports amplifier for radar.

Boeing 707 to Test Public Address System

Los Angeles—A new test public address system, designed to improve the intelligibility of cockpit announcements and permit playing of recorded music or radio broadcasts, is slated for tests on Boeing's new 707 jet transport. Active and acoustic manufacturers representatives were given a demonstration of the system at the recent Western Electronic Show & Convention here. Made at Remel Co., Ltd., of San Francisco.

In a demonstration to American Airlines, announcements came over with musical clarity and intelligibility despite high-level simulated engine noise played over a tape recorder, although the acoustics of a hotel were so accurately reflected from those in an outdoor cabin.

• Features—The new test system will operate with Remel's recently announced transistorized transducer mixer (Aviation Week Jan. 25, p. 35) or with a dynamic or carbon mixer. The amplifier heart of the system can be substituted for mixing amplifiers, Remel says. Other highlights include:

• Low Distortion—At full output across mean total harmonic distortion is 10% over the frequency range of 200 to 8,000 cps—Remel says.
• Variable Frequency Response—Amplifier's natural response (flat within 3 db from 200 to 8,000 cps) can be preset for varying degrees of low frequency

"BOMBS AWAY"—The story of an R & P bomber.

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A black and white photograph of a man in overalls, looking towards a box of Scott Industrial Wipers. In the background, a circular inset shows a man looking distressed, holding his head. The main text reads: "Nobody likes a dirty wiper".

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In aviation plants, the Wiper has caught on fast. From maintenance to final assembly—in almost every de-

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Scott Paper Company, Dept. A W-3, Chester, Pa.
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information for voice use to provide optimum intelligibility. Antennas does not mean into play when enough for a trial for music reproduction.

- Remote Gain Control: Normal volume level of the system can be increased for the important voice announcements by means of a remote control located in the cockpit and viewfinder station.
- Parallel Speaker Operation: Speakers are connected in parallel from a 70.7 volt amplifier output line. Each has a variable tap (voice coil) transformer to permit balancing of individual speaker volume level.
- Compact Size & Weight: Receiver was that its new amplifier is no larger and only slightly heavier than existing 10-watt p.a. system amplifiers.

Company's address is 2381 Brent St. San Francisco 10, Calif.

Missile Relay Takes Shock, Vibration

A new relay for missile use is now perfectly capable of withstanding 10G shock and 10G vibrations at 500 cps, considerably beyond the 5G's limit called for in MIL-STD.

The 25-volt relay is a low PDM unit, with contacts rated at 5 amp.



resistive load at 25 v.d.c. at 114 v.a.c., 600 cycles. Unit comes in two models: AN100-1, with AN connector base, weighs 0.5 lb., and AN100-2 with solder terminals, weighing 0.225 lb. Both are hermetically sealed. Ambient temperature range is -55C to 75C. Manufactured by U. S. Relay Co., 1744 Alhambra St., Los Angeles 11, Calif.

Other new components announced:

- Subminiature relays, available in four new types (4V1, 5V1, 2V1, and 3V1) rated for maximum a.c. input (rms) of 57 to 110 v., and for maximum d.c. output of 60 to 300 v.



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And its S-50 Janitrol "whispering" combustion heater means plenty of cold weather heat for passenger comfort, and all utility needs including the new Beech-designed cold weather engine pre-heating system — one of the first in commercial production aircraft. A separate blower (1), independent electric fuel pump (2), and ducts (3) to the engine nozzles let the S-50 heater (4) do engine pre-heating without need for an outside heat or power source. Janitrol dependability means you'll have heat whenever you want it. And Janitrol acceptance means you can quickly solve your business aircraft heating needs by contacting your local modification center, or you can write direct to us.



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Aerovox, Inc., International Airport, Van Nuys, Fla.



HANDY CALCULATOR dials gear

Plastic Calculator Gives Gear Inspection Data

New gear inspection calculator determines the relationship between tooth thickness and axial displacement and total composite error for pinion angles of 20, 30 and 145 deg. when the pin is supported on a gear rolling fixture. It is used to solve problems like these:

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Dexter Machine Products, Inc., 20451 U.S. 12 West, Chardon, Mich.

Leakage Eliminated in Rotary Plate Valves

Optically true hardened steel plates in a new series of hydraulic non-leak rotary plate valves are said to eliminate virtually all leakage between ports.

The new valves are housed in lightweight aluminum alloy bodies. The manufacturer claims that, by using simple design and minimum number of parts, handle loads are kept unusually light. The valves are available for 1,500- and 3,000-psi service. They meet specifications MIL-V-55295.

Pacific Div., Bendix Aviation Corp., 11600 Skyway Way, North Hollywood, Calif.

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Pneumatically sealed sheet of extremely high surface permeability and high tensile strength is recommended for boundary layer control applications on high-speed landing aircraft. The sheet is said to have naturally smooth, non-corrosive surface and fully controlled permeability. It permits an airflow of 0.5 cubic feet per second per square foot at a differential pressure of 0.21 psi. Density is approximately 0.075 that of solid stainless steel—Aeroflex Plenum Metals, Inc., Glen Cove, N. Y.

Pneumatically sealed, designed for all aluminum alloys, a plastic bonded low-temperature bonding (applied with ultrasonic heat), requires no heat, does not upset alloys' heat treat. Ten bond, which is stronger and bonds at temperatures from 150 to 300°F, and Wetbond, a high strength, high temperature material that is capable of bonding at the solution heat treat temperature of the parent metal, making possible simultaneous heat treat and bonding—Pneum Electronic Research Co., Glendale, Calif.

Rollstiller plastic hose, designed for use with wet jet fuels and synthetic lubricants, now comes with tapered, forged one-piece aluminum elbow fittings. New fitting is said to reduce resistance to flow, give more strength for less weight—Rollstiller Corp., Buffalo, N. Y.

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WORLD AIRLINE DELEGATES at the 19th annual general IATA meeting get instructions of address for interpretation over telephone.

IATA Looks to Air Cargo for New Profits

- Hildred says expansion of airfreight would increase revenues but warns of risk in buying the equipment.
- Committees suggest faster development of short-haul cargo services to solve airlines' financial problems.

By Frank Shaw, Jr.

Paris—The world's scheduled airlines, fighting ever rising operating costs and increased government taxation without reason of their free markets, are looking for other ways to boost sagging profits and strengthen the foundation of the industry.

One major potential solution, widely recognized as to now, is worldwide development of air cargo, delegates to the 19th annual general meeting of the International Air Transport Association here were told.

• **Commercial Expansion**—IATA director general Sir William F. Hildred, in open discussion, told the meeting the time has come to give as much impetus to airfreight development as airlines have to development of passenger services over the years.

An industry that has digested the complex international pattern of fares for first-class aircoach and even Class "Y" service should be able to direct its ingenuity and know-how to its participation in the cargo market, he said.

Expressing the hope that the level of

cargo fees might be substantially reduced, he said that while you cannot ship goods on coach, services use of the all-cargo aircraft might be the answer.

• **Considerable Risk**—"This it will not be easy," he warned. "The cost of my aircraft today is high and going higher. Purchase of this type equipment involves considerable risk."

"The serious expense of certain cargo operations at this moment has involved there is no safe-type and even serious risk. But it cannot be directly related until all-cargo aircraft are available, yet the absence of such aircraft keeps rates high and traffic restricted."

Sir William said the artificial situation to all-cargo traffic resulting from abnormal political conditions has put more freight transport into operation. "But once the situation is corrected, the problem of what to do with the aircraft in normal commerce remains," he added.

The IATA director general was quick to point out that he threw these particular considerations to more as a

challenge than a deterrent, holding that the industry has taken equal if not more serious risks in pursuing its passenger field over the years.

• **Cargo**—Potentialities—Another important point of discussion at the meeting was debate efforts to accelerate development of the helicopter for wide-spread scheduled service, held out as a service answer for the lobbying of services through additional traffic.

IATA's technical committee and airlines and the general public no longer think of the helicopter as being of potential interest in the air transport industry at some solution before date, pointing to its present use as passenger airplanes.

"It is true that in its present stage of development the application of the helicopter transport is still limited due to the constraints of the present technology," the committee said.

"Nevertheless, here again we have given the manufacturers in good time from the industry's overall viewpoint, an outline of the type machine we need to make the project attractive economically as well as technically, and are already about to see prototypes showing greater promise of adaptability for public transportation than helicopters."

The committee went on to reiterate that a commercially viable cargo copter could be delivered soon.

• **Shortland Edge**—The advantage of a commercially viable helicopter from

for use... at 60° below



The CF-100 with its ORENDAs was meant to fly and fight in the Arctic. So that's where it's been tested. In the bitter wind-swept cold, engines must start, controls move, radio be clear, guns fire, and the pilot's hands and feet be comfortable within minutes after a "Bomber Land" alert.

It's routine now to leave a CF-100 out overnight with but a light wrap to keep the wings clear of frost. After a 15-hour "cold soak" in temperatures of 36° to 60° below they peel the wraps, check switches and take off. If it's not cold enough at Niemi, near Edmonton, they fly non-stop to Port Churchill on Hudson's Bay.

Defender of the Arctic, the CF-100 is in squadron service with the R.C.A.F., at strategic bases. On daily flights, it probes the perimeter of those areas most likely to need watching.



This CF-100 has had overnight "Cold Soak"

CF-100, WORLD FLIGHT RECORDS—the 2180 miles from Vancouver to North Bay was actually flown non-stop by a CF-100 in 3 hours, 50 minutes at 550 M.P.H. Flown by P/L M. Kabanoff with P/L D. Thorne, Navigator, this was one of many tests performed by the CF-100's of 645, all Weather Squadron, R.C.A.F., Upland, Ontario. It is the longest non-stop flight completed by a fighter aircraft.

Ground Crew subject test from which scoring GIVEWAYS



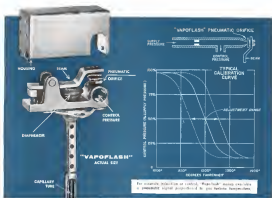
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control lever beam which operates a pneumatic orifice. Computer diaphragm pressure serves to supply accurate "adaptive" power in one-to-one ratio available for control actuator. With several "Vapoflash" units connected in parallel the averaging, reliable measurement and control of gas turbine temperatures is simplified.

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NEW IATA PRESIDENT Juan T. Tappé (right), who will serve 1955-1956 term, is congratulated by Max Ibrahim (left), Air France president and head of IATA for creating the Air Wilkes (center), IATA flying group, named in recognition. Head of the American World Airways position Tappé names the U.S. will be lost in 1955.

IATA, unless standard, especially those in Europe, is as potential for shock-and-panic. It is well known that most standard services presently available to cover their costs and that the most profitable airline operations lie in the long-haul passenger market.

One of the main reasons for the economic problems of the short-haul routes, the executive said, is the inadequate utilization of aircraft—with a high number of landings in proportion to distances flown.

In addition, the executive said, the short-haul airlines must have strong passenger preferences for travel at particular times of day. Turnover does not want to arrive at an airport late at night, then ride for another hour from the terminal to the city.

The helicopter, with its flexibility for landing in downtown areas, would solve this problem, the executive pointed out.

Diesel Solution—Since utilization of any considerable profit from other cargo operations is helicopter operations still lie somewhat in the future, IATA believes that are working toward a more accurate and direct solution to their economic dilemma—that of cutting operating costs to a bare minimum.

Regarding under a two-fold program the IATA term its "VAPOFLASH" campaign, members airlines are making a concentrated effort to reduce operational risk and to stabilize their external expenditures. The association firmly believes that campaign should see some reduction of deficit accounts.

"We will go a long way toward reducing a better risk before costs and profits," said one member.

Red Tape War—Preliminary originally referred to a simplification of governmental procedures—procedures which cost the industry a great deal. It was found, however, that these procedures are based on a kind of "red tape" of action. IATA's executive committee reported the current one is much as a "red" with red tape in their respective governments.

Typical example cited was the passenger manifest. IATA has been doing an intensive effort to have governments eliminate them, but certain airlines maintain they need them to cover their costs on ticket requests, etc.

One particular airline that eliminated one copy of the manifest, however, lost the following to report.

In abolition of a single copy of the document used for statistical purposes on its own system it has saved nearly 100,000 sheets of duplicate paper, 100,000 sheets of paper, 12,190 ctn of workbooks, three years for 600,000 sheets and the savings of 2,000 lb of company steel.

The mechanical surface, it was pointed out, accounts for about 5% of the world's traffic, and three are on the average. It is expected that standard multiplication of these figures 75 times gives an approximation of the necessary effort and expense the industry is doing to save its documents.

No Show—Luggage—Luggage screen problem IATA hopes to be able to avoid in the near future in the "no show."

Ray W. Ireland, vice president of United Air Lines, estimates that no show are costing airlines about \$10 million a year.

Ireland said that airlines in this problem line is a tightening of airlines' reservation systems, along with some means of persuading the public to give advance notice of cancellations.

Overseas Charters May Stop Filing Rates

Civil Aeronautics Board plans to end the requirement for filing tariffs on overseas military charter operations to eliminate position paper work.

The Board says it finds going to go, make rates for international operations and "is unable to take effective" action even though tariffs at astronomical levels are filed.

Although it does have authority to investigate and remove rates of "unfair" documents, as before, says now, CAB says this authority is not well adapted to military charter operations for special situations and that periods before operations could be completed, CAB adds, "the transportation would probably have taken place rendering control ineffective."

Pointing to "the enormous levels in which military charter rates have fallen in a case of the policy of unrestricted bidding and a temporary excess of available capacity by charter following the termination of the Korean conflict," the Board says that since it cannot effectively control the problem, "action must be placed upon the Department of Defense for any rate stabilization in this field."

Interested parties must submit views or arguments on the proposed rule changes by Oct. 25.

CAA Sets Up New Approach Light Rules

New standards for approach light systems have been set up by Civil Aeronautics Administration. The new rules will set the standards for new and existing CAA airports, lighting systems and will govern approval of the use of federal funds for such installations.

The requirements were formulated by a subcommittee of the Air Counciling Committee on the material studied on approach lighting.

These configurations are specified, all requiring two threshold bars and one or more cross bars.

One configuration is to be installed at the approach end of an instrument runway with an obstruction for an over run area. A second would be used at the approach end of an instrument runway where no overrun area is designated. The third configuration has only one runway approach.

The criteria are supposed to be 1,000 ft long. Authority can be obtained to change instrument runway or other problems at airports.

Approach with frequent very low visibility will install expanded flashing lights where CAA and local studies indicate they are necessary.

lease Department's management of passenger and freight traffic from Kankakee, former member of Interstate Commerce Commission and of the Oil and Defense Transportation, will direct the passenger traffic study John R. Staley, Chicago, vice president traffic of Quaker Oats Co., will direct the freight traffic study.

CAB ORDERS

(Start Sept 15)

GRANTED:

Flug Tiger Line's application for its certificate to make a charter service from London to Berlin.

Stark Airline and **Flug Tiger** Line's application for leave to intervene in the case involving domestic airlines and rates.

Allegany Airlines' application for a temporary exemption allowing it to operate certain routes on Route 77 with certain conditions.

Piedmont Airlines' application for leave to intervene in the case involving direct service between Norfolk, Va., and Atlanta, Ga. General Aviation' parties for the same purpose is denied.

Capital Airlines' application for a temporary exemption allowing it to operate its specified routes to Houston, Okla.

DENIED:

W. De Haven application for a certificate for unclassified service in the Western Pacific, by default.

Western Airlines' application for a modification of public convenience and economy, by default.

Frontier Airlines' application for a certificate of public convenience and economy, by default.

Capital Airlines' application for service to Richmond, Va. as a stop on its Washington-Norfolk route. Capital chose not to pursue its application at present.

Chamber of Commerce Studies Airline Policy

The transportation and communications department of the U. S. Chamber of Commerce is considering a number of proposals for changing transportation policy.

Policy suggestions presented to the committee include those proposals from airline representatives:

- Government policy be tightened on exceptions under which non-scheduled or common carriers.

- Local service airlines be given a more stable guarantee of being able to continue in operation, if not in permanent existence than that which is the present form of certificate.

- A specific policy be set up by governing government competition involving such services as the Military Air Transport Service.

- User charges for transportation costs, such as the federal income, be studied and recommendations be made for a reasonable schedule of charges.

A special subcommittee will review the no policy report of the Air Counciling Committee and study its relation to chamber policy.

The committee staffed past jobs, favoring the report of Section 12 that private rates involved in government contracts with private transportation modes.

All proposals will be reviewed by the transportation committee and recommendations made for policy changes or new policy to the chamber when it can meet for its annual meeting in May.

SHORTLINES

- **Allegheny Airlines** reports passenger traffic for August up 33% over last year. Scheduled routes flown were up 10%, load factor hit a record 93%.

- **Allegany Airlines** is concluding a deal with Lockheed for two new Super Constellation. The Constellation carrier has three Super Constellation scheduled to go into service Oct. 1.

- **Central Airlines** closed its 54th anniversary this month. During the past five years, Central carried 163,840 passengers, flew 23,841,081 passenger miles.

- **Norfolk Island Airlines** set two new records in August when 127,713 passengers were flown, 161,318,000 passenger miles over domestic and international routes.

- **Piedmont Airlines** flew a record 5,000, 708 revenue passenger miles during August, topping the previous high of 4,965,660 in October 1957. Piedmont carried a total of 16,414 passengers, a 17% increase over July and a 56% gain over August 1957. Mail climbed 127% to 15,850 tons and air cargo increased 11% to 6,599 tons and, air freight gained 46% to 34,730 tons.

- **Reed Airlines** will open its winter cruise program through the Caribbean Dec. 1. Cruise run times are two weeks, range from \$236.98 to \$399.98.

- **Western Air Lines** start tonight service between Los Angeles and Seattle. Tacoma this week when four new DC-58s go into service. New flights will follow the pattern of W.A.L.'s long-haul and overland "California" routes and will feature a special eight-passenger compartment for January conference.

AVIATION CALENDAR

Sept. 16-Oct. 14: Intercontinental Conference for Airlines. All annual meetings, D. C.

Oct. 12-13: Annual Power Division meeting, Lexington Hotel, New York.

Oct. 14-15: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 15-16: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 17-18: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 19-20: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 21-22: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 23-24: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 25-26: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 27-28: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 29-30: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 31-1: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 2-3: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 4-5: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 6-7: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 8-9: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 10-11: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 12-13: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 14-15: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 16-17: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 18-19: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 20-21: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 22-23: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 24-25: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 26-27: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

Nov. 28-29: 44th annual National Electronics Conference, Hotel Sherman, Chicago.

WHY IT PAYS TO BUY MX SCREW STOCK FROM US



• Hundreds of shop cases have shown that U.S.S. "MX" free-machining tool stock cuts tool costs considerably — an average of 10% to 15%, sometimes as high as 40%. And the more machine work your parts require the greater the savings.

Here's how you cut costs when you use "MX": make these other free-machining guides:

You get more parts per hour, longer tool life with less down time for grinding and adjustment, fewer

grinds, closer tolerances and better part finish.

One of our qualified sales representatives will gladly discuss the advantages of "MX" with you as they apply to your particular shop requirements. And you can always depend upon quick delivery from the nearest U. S. Steel Supply Warehouse.

In addition to "MX" stock we carry: cold finished rounds, squares, hexagons (flat) and precision steels in all grades.

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Persuading Motorists to Fly

Instead of trying miserably to capture passengers from competing air carriers, Continental Air Lines is launching a campaign to divert motorists to the air.

Convinced that thousands of auto miles can be converted to plane travel, especially between major distant points, the company will increase its advertising to extol the savings of air travel over car travel.

"Twelve cents a mile AUTO or 6¢ cents a mile AIR," is the theme. Copy will show figures of cents per mile of operation for 15 leading makes of cars driven over 10,000 mi.

Since readability surveys conducted by some major airlines have revealed high interest on the part of the public in information on motor cars and their costs, Continental may have a popular and effective campaign.

Costs to be shown include the per-mile rate both to operate a car and to own a car, total costs per mile will be listed for a car bought with cash, and also for a car that is being financed. The average of 12 cents a mile results, excluding cost of meals, tips and hotels.

"Intense traffic by auto is an unmet need for ready sales of air travel," states Halting, Continental vice president, before.

Continental should also stress the vital time element, with the dramatic differences in elapsed hours for car and air trips. Fatigue and comfort contrasts are worthy of attention. The airlines' funds for plus should be presented vigorously in the campaign, to answer the motorist's frequently expressed opinion that he can take his time on the car so much cheaper.

The airlines have complained bitterly for years about what the competition of the motor car has done to their business. But a not years before this, recognized the threat sufficiently to direct their advertising to drivers. While the speed differential between car and plane is greater than between car and train, and represents no smaller threat to air, it is still gratifying to see an airline recognize a good market when it sees one.

Too much airline advertising is still unimaginative and pedestrian, lacking the personal touch that tells the motorist exactly what air transportation can mean to him. Continental's basic direction of cars and their costs in talking popular language, and with something like 40 million cars operating, that is quite a sizable public!

Slow Down the Mails!

It seems a bit late, even for the airlines, but we've waited it to happen. Security of their present contributions of the government's use of the airlines for direct-mail letter mail.

They propose a follow-up investigation by Civil Aeronautics Board, including postmarking and likewise in query into a practice they feel is violating a law. They believe there is a law that prohibits that postage rates for all mailable first-class matter being sent by air shall be no more than twice.

What is the basis for the complaint? Postage rates to the public? Hardly that! The complaint is that the airlines already have lost \$825,000 to the airlines in New York-Chicago through-rail traffic alone. They say extension of the service would "make more likely the loss permanently of revenues."

Of course, they are probably absolutely right. But they ignore the profound objective the Post Office Department had in mind when it launched this revenue-honoring experiment. The government seeks to render the public a better mail service, and we are convinced that in this respect, at least, the experiment is an unqualified triumph. It seems exceedingly doubtful that the P. O. would jump into such a sweeping revision of traditional practice without first scrutinizing the federal code.

And if we read our history books correctly, the railroads showed little sympathy on the canal boats they supplanted. Neither did the public. This country's citizens will always demand improved services. If this were not the case, the canal boats would still be carrying the mails, freight and passengers.

The airlines appear much better off than the canal boats. They are, indeed, bound to be about washed up in another five or ten years so far as long-haul passenger business is concerned, but they should continue to be with us for quite a time to handle our bulky, low-value freight shipments.

Helping Communities in Trouble

The remarkable abilities and record of the helicopter in saving human life is one of the noblest facets of aviation. Those of us in the business now take this escape attribute of the helicopter in pretty much of a sophisticated, casual manner because already it's an old story—now though great.

Each day, all of us realize the chapter has only begun its action scenes in the world, and there are many brilliant achievements yet to be marked up on its record.

Ownership and operation of helicopters by police and other government services is becoming almost common. Some even use helicopters to assist one at least age.

In the meantime, however, it is a source of pride to us as aviation that some aircraft companies have offered their own helicopters to their communities in times of trouble.

Douglas Aircraft Co. has made its three-place Bell available to Santa Monica's police and fire department in an emergency.

North American Aviation, which issues a Bill from a commercial operator, has used it on several occasions to assist Los Angeles County firefighters in moving children from a burning building.

Other similar examples of free give service by aviation company owners of helicopters are probably well known to citizens of many sections of the country. We hope there will be more. We know the helicopter will continue, with increasing frequency, to remain the world's first aviation aid and can always be a successful protector of human life.

—Robert H. Wood



USAF DESTROYS UNSEEN TARGETS; PLANES USE RADAR BOMBSIGHT

THE STORY BEHIND THE STORY.

- You've read headlines like the one above, reporting the precision of Air Force bombing—during tests. Within hours after an apparent aerial, you would read them again—reporting deadly consequences. Night or day, regardless of weather, America can carry out its policy of instant retaliation to any aggression—or any part of the world.
- Now at large-scale production, the Air

Force K Bombing System combines automatic navigation with all weather reconnaissance and bombing of any target. With the aid of the Sperry Gyroplane Flight Control and the K System, the crew flies the high-speed bomber to the target area. Using the Sperry-designed Bombing Memorandum Computer, the bombardier locates the target visually, or if hidden, by radar. The effects of speed, altitude and wind on the falling bomb are automatically computed—enabling the bombardier to zero direct hits in simplifying the complex job of bomb-

ing in extreme obscurity from high speed air. The K System permits more time and flexibility on the bomb run—more certainty of "mission completed."

■ There's little resemblance between the automatic "house" and the first bombsight developed by Sperry for use in World War I—a simple telescopic and range scale no larger than an egg. Modern bombsights made possible accurate military-industrial losses, equipped the needs of modern defense—then and there needs with a strategic bombing program, which enhances credit with helping to prevent a new global war.

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